FOUNDRY
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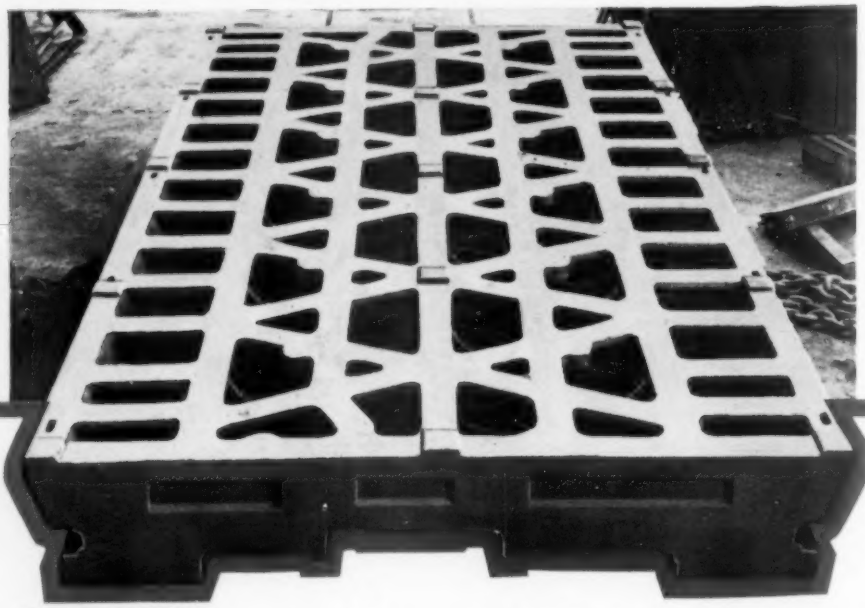

COROVIT SLASHES COREMAKING COSTS

at George Richards' Foundry

The coremaking time for the above 14 ton bed casting (19′ x 9½′ x 1¾′) for a horizontal boring machine was cut from 300 hours to 129 hours by using the Corovit cold setting technique. Further savings were made in decoring and fettling times, because Corovit cores reproduce accurately the dimensions of the corebox. And, of course, Corovit gives an improved finish, substantially reducing subsequent machining.

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ASK **FORDATH** TO TELL YOU ABOUT **COROVIT** COLD-SETTING TECHNIQUE

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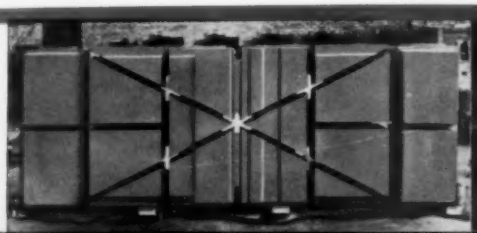

Above: One of the six 30 *cwt. cores used in making the* 14 *ton casting. Each core measured* 8′ x 3′ x 1¼′.

Above: Unstoved cold-set Corovit cores being lifted from the corebox in the green state.

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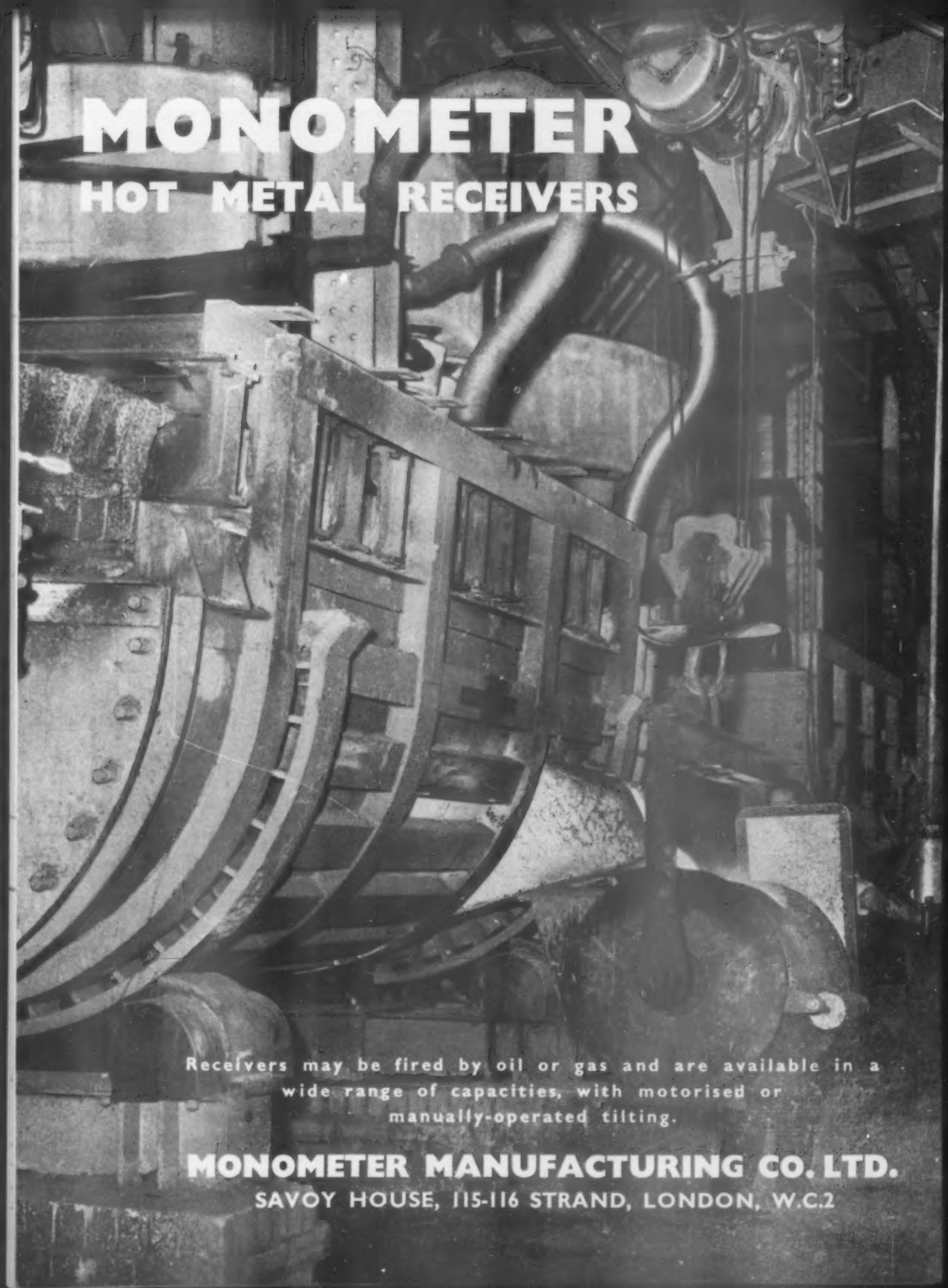
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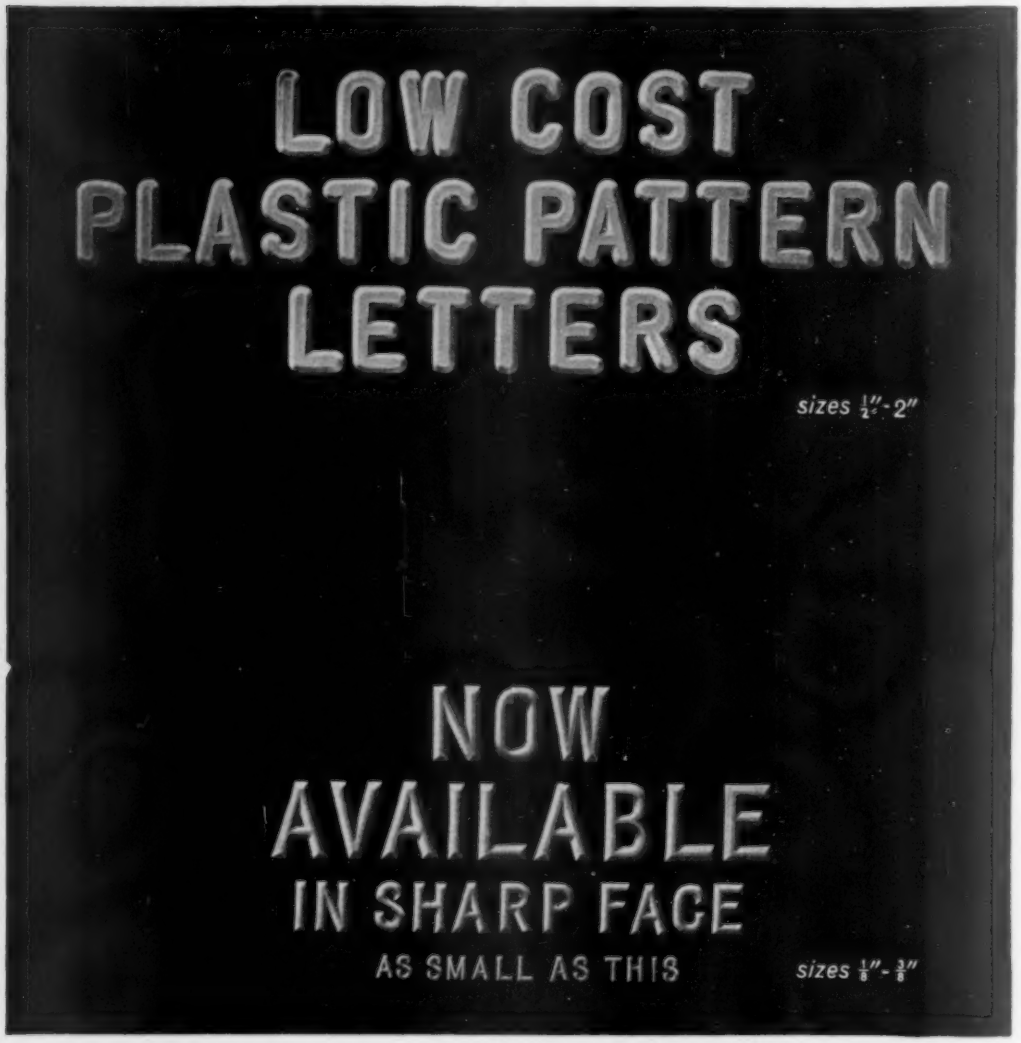

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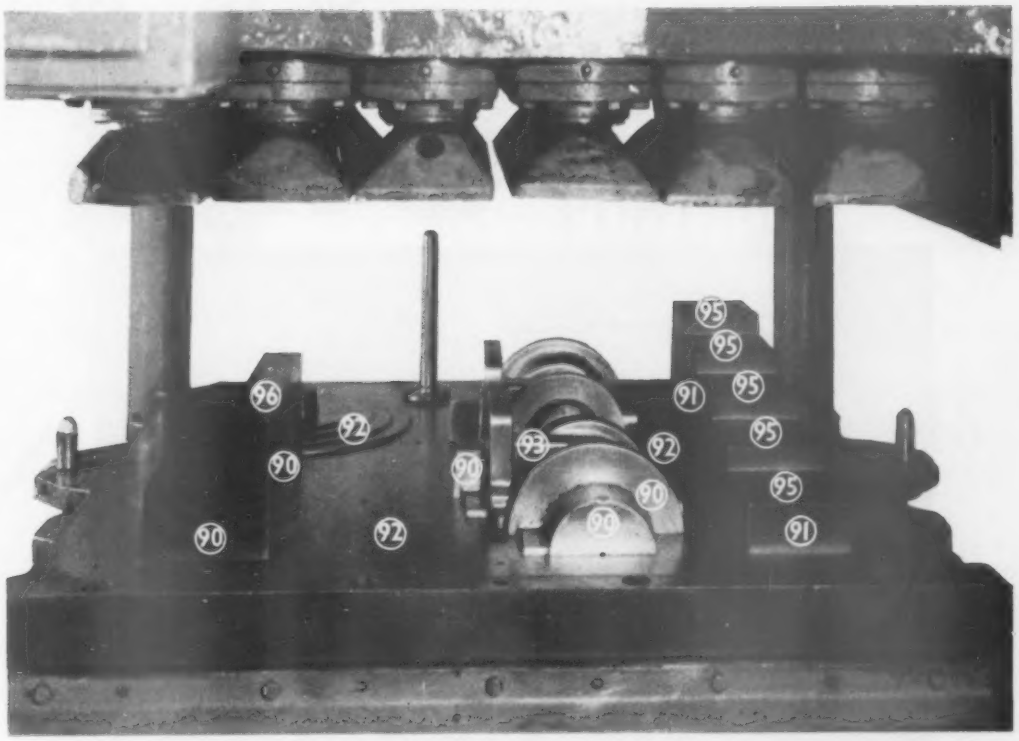

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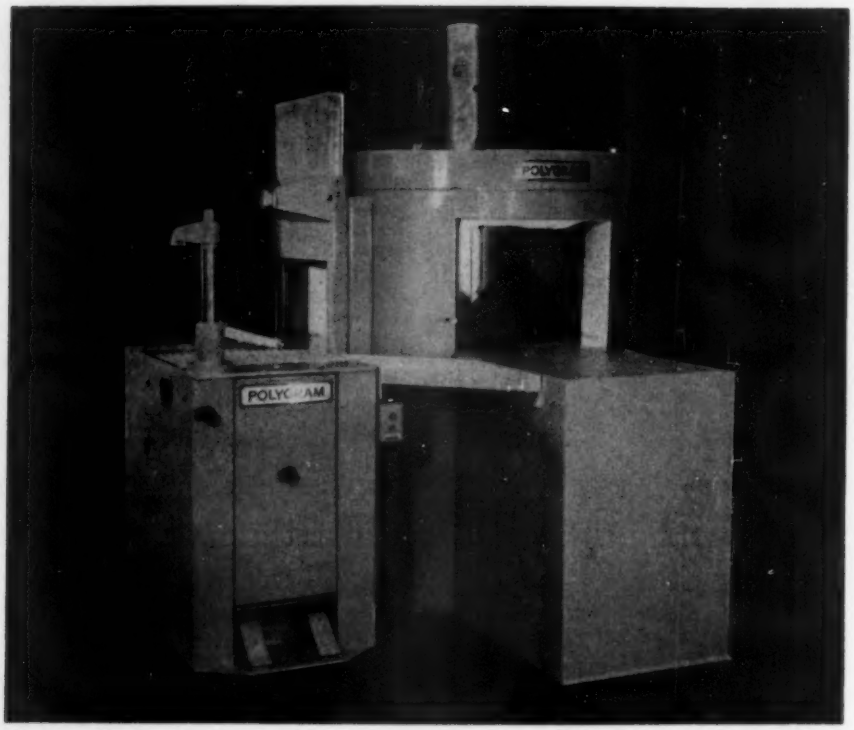

Designed to bring all the economic and technical advantages of shell cores into *your* foundry, the latest Polygram CMU Shell Coremaker is the fruit of 12-years of continuous research by the only British Specialists in Shell Moulding and Coremaking. Note that the unit construction enables you to fit a CMU core blower or oven into your existing layout and to expand it into a full CMU Shell Coremaker at *your* convenience.

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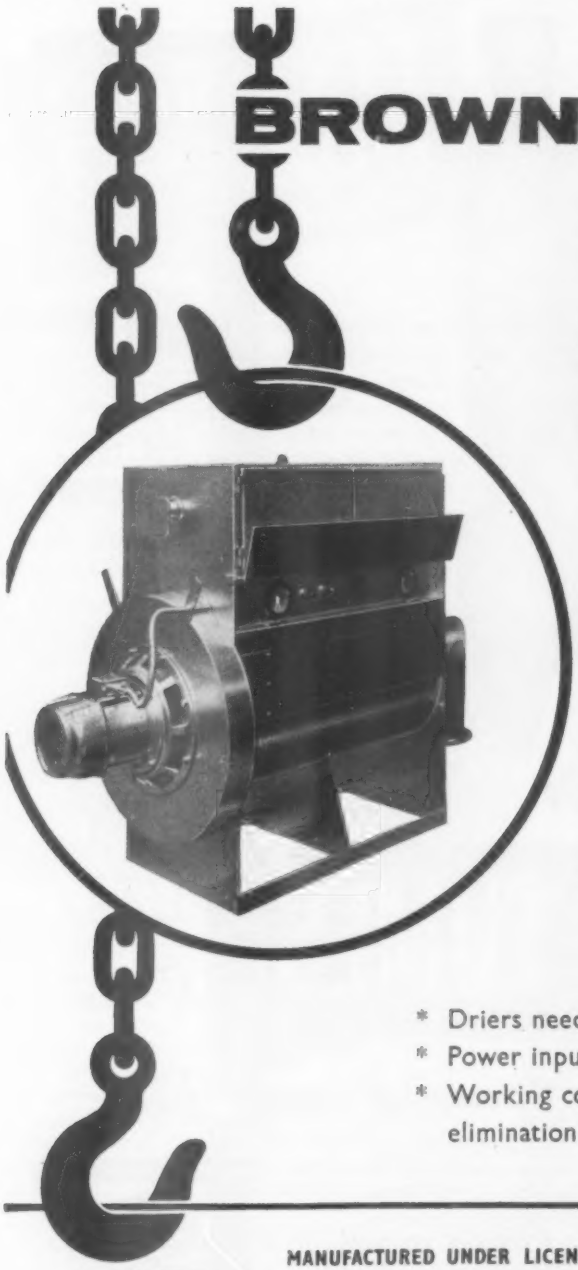

. . . designed for drying floor moulds or large box moulds for ferrous and non-ferrous metal castings. They operate by forcing hot air over the mould surface and through the sand giving quicker and more efficient drying than is normally achieved by other methods. Using air temperatures lower than hot gases, and less than one third the quantity of heat, they reduce drying times by half. Heating is uniform throughout the mould and despite rapid drying, surfaces remain free from cracks and cleaner castings are produced.

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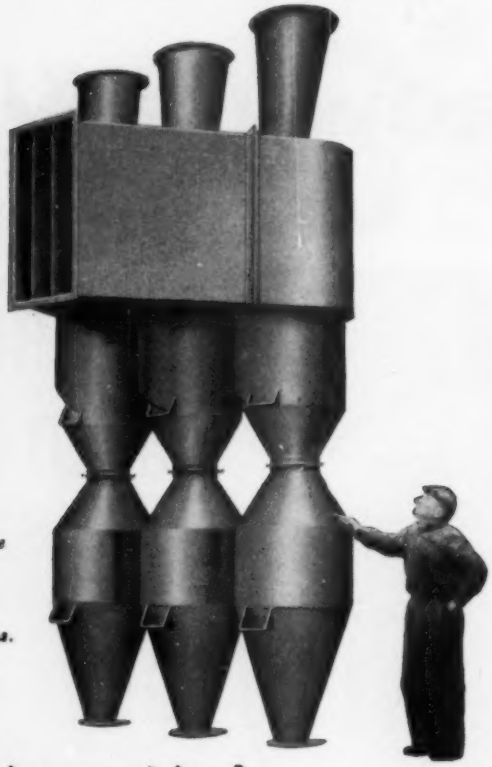

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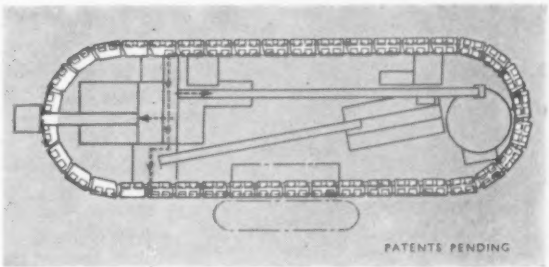
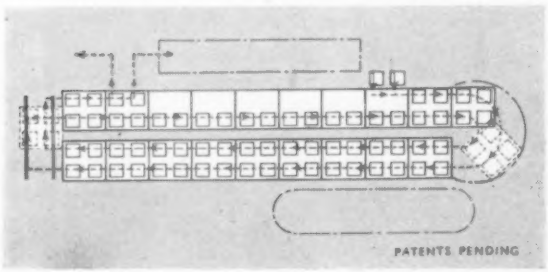
Snap or tight flask moulds are set out in outside position on the car, poured, and travel almost completely around the loop. They are then transferred automatically to inside position on the car, and continue around the loop again for automatic removal at the shakeout. These new systems provide almost twice the cooling time of a conventional mould conveyor carrying only a single line of moulds; effecting substantial savings in floor space, equipment, building, and other facilities.



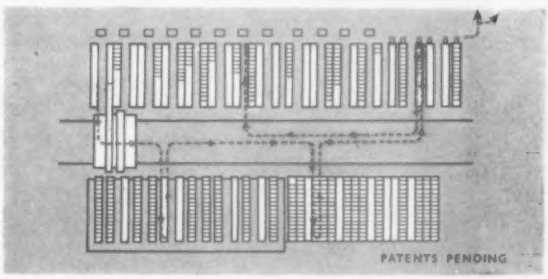


"Double MRI" Mould Handling System

Rectangular loop, consisting of two straight runs connected with a rotary turn and transfer car. Cars advance one car length, then remain stationary for timed period so large moulds can be loaded onto the conveyor, poured, and the moulds removed, while the conveyor is stationary. Moulds are carried side by side on the cars and make almost two complete trips around the loop, thus nearly doubling the cooling time per square foot of floor space.

"MF" Mould Handling System

Unlimited flexibility for jobbing foundries. The transfer car delivers pallets loaded with similar moulds, to the pouring, cooling, and shakeout zones, and returns the pallet with the bottom boards and bands—or flasks—to the moulding area. Handling similar moulds together permits moulds for different castings to be kept separate, and even poured with different metals, without interfering with other groups of castings. Slow jobs do not hold up the fast jobs. Moulding, pouring, cooling and shakeout are centralized, minimizing the equipment requirement.



Write today for a copy of Bulletin No. 135. It gives full details about eight different types of Bartlett-Snow Mould Handling Systems.

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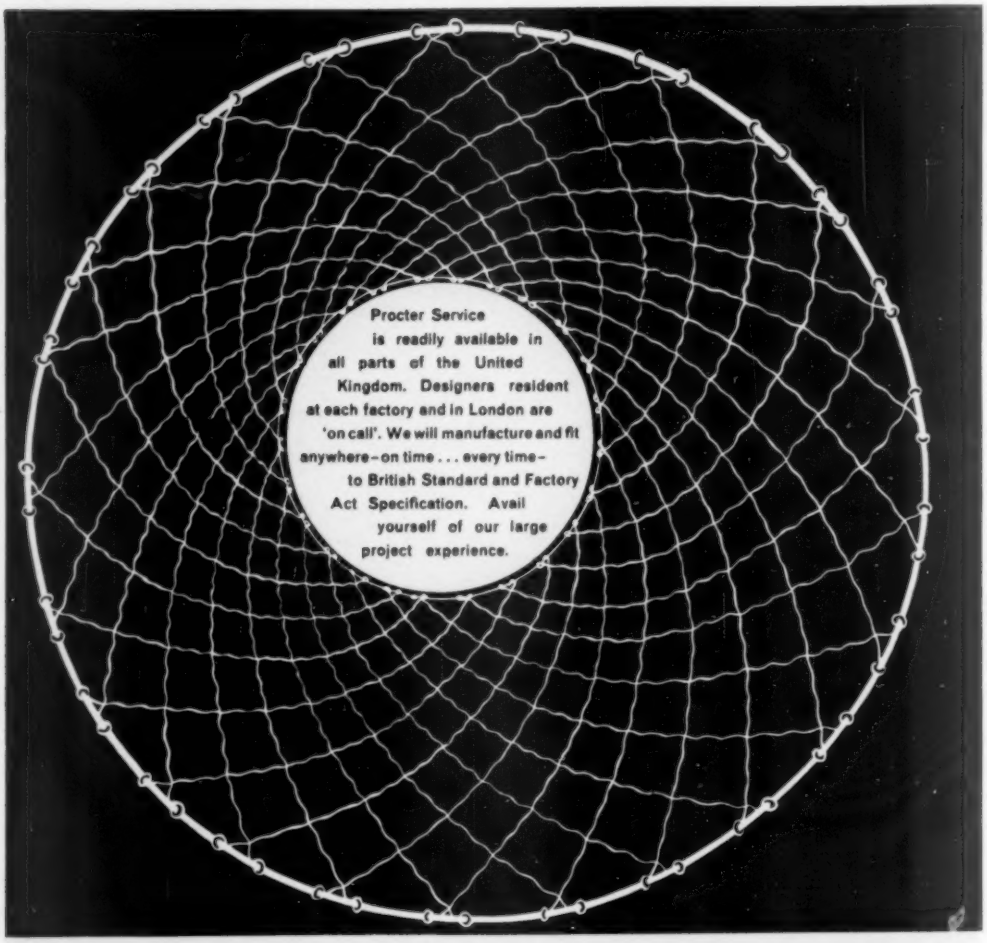
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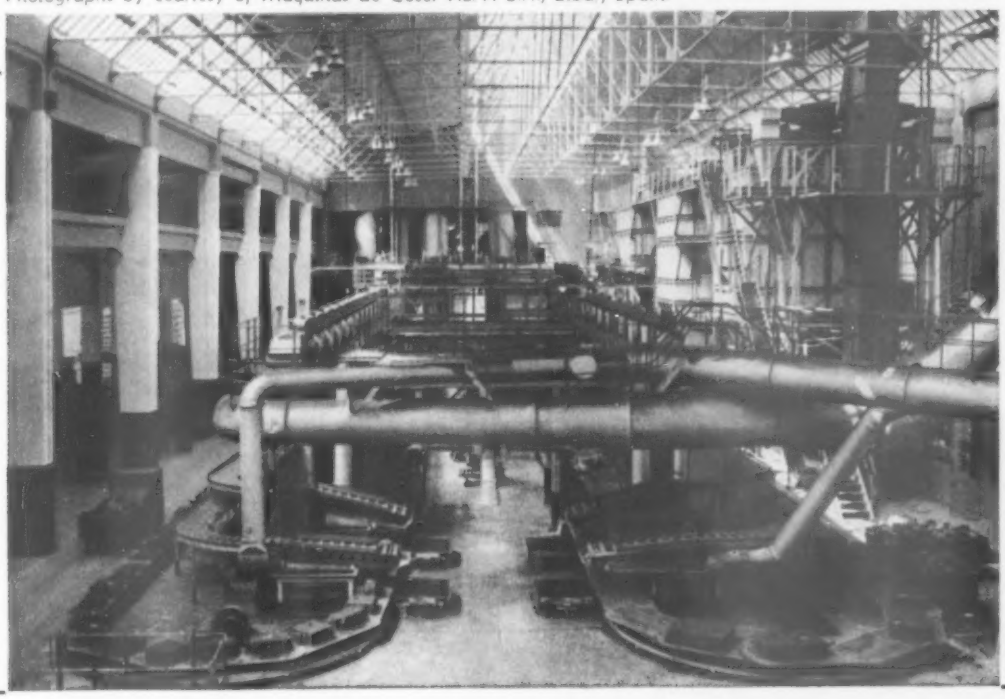

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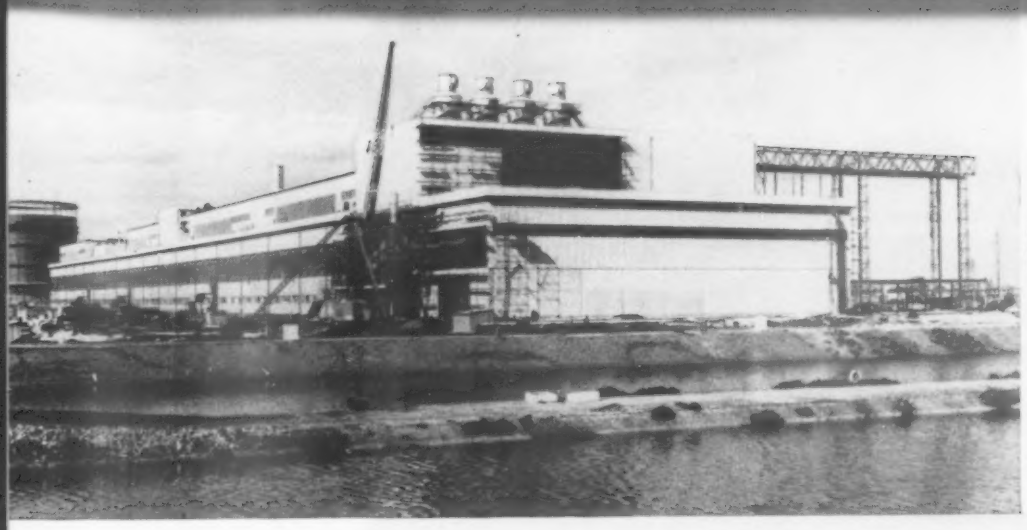

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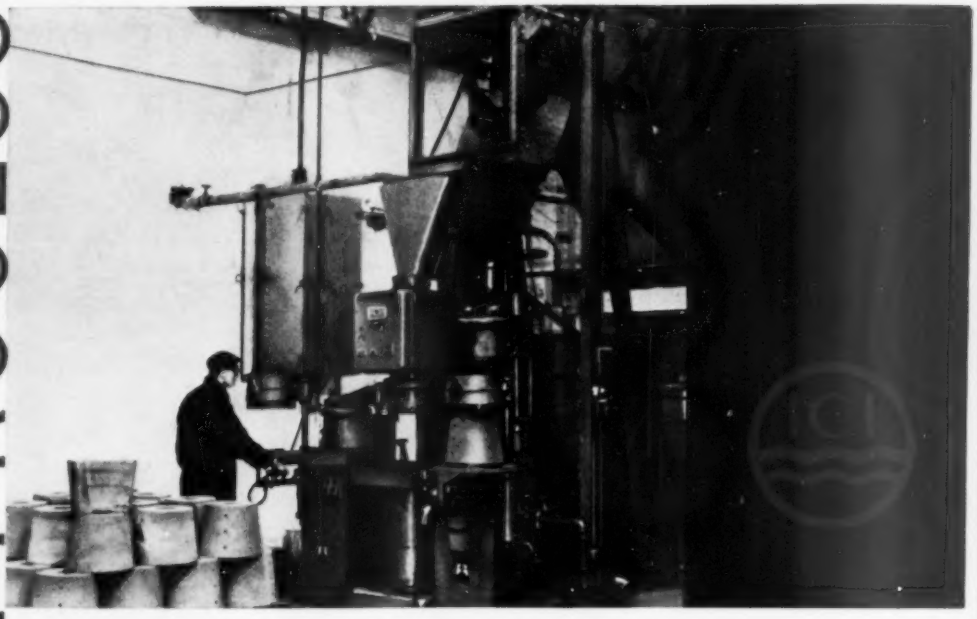

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TURNOVER MOULDING MACHINE

semi-automatic type MRPW
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The above reasons make the machines most suitable for incorporation in fully and semi-automatic moulding units

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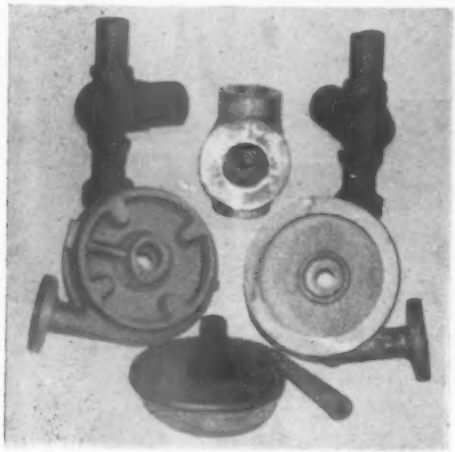

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IN THESE DAYS OF BIG BUSINESS CONSORTIUMS, TAKE-OVERS INVOLVING HUGE SUMS AND CARTELS WITH VAST RAMIFICATIONS, THE SMALL FOUNDRYMAN CANNOT AFFORD TO IGNORE MODERN METHODS. AFTER ALL, HE MAY BE STARTING AN EMPIRE!
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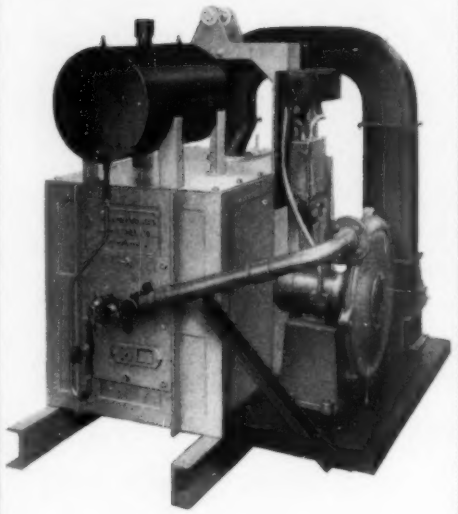

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The SHEFFIELD SMELTING Company Limited

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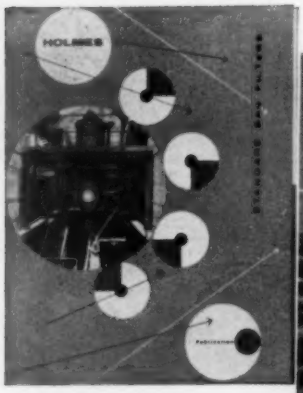
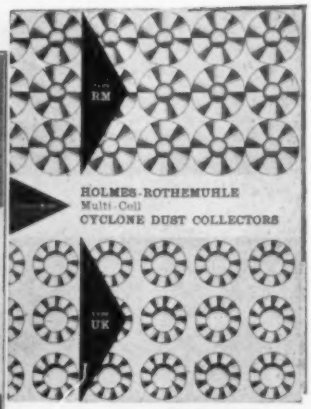
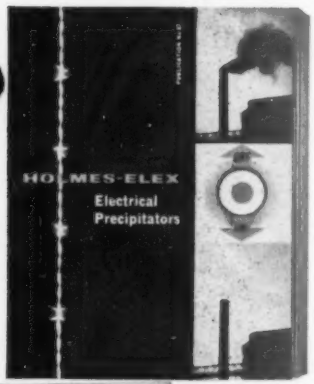




Which?



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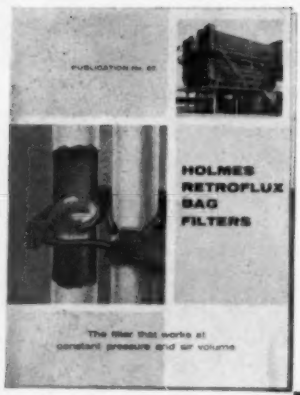

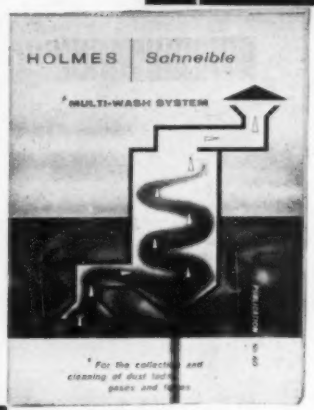

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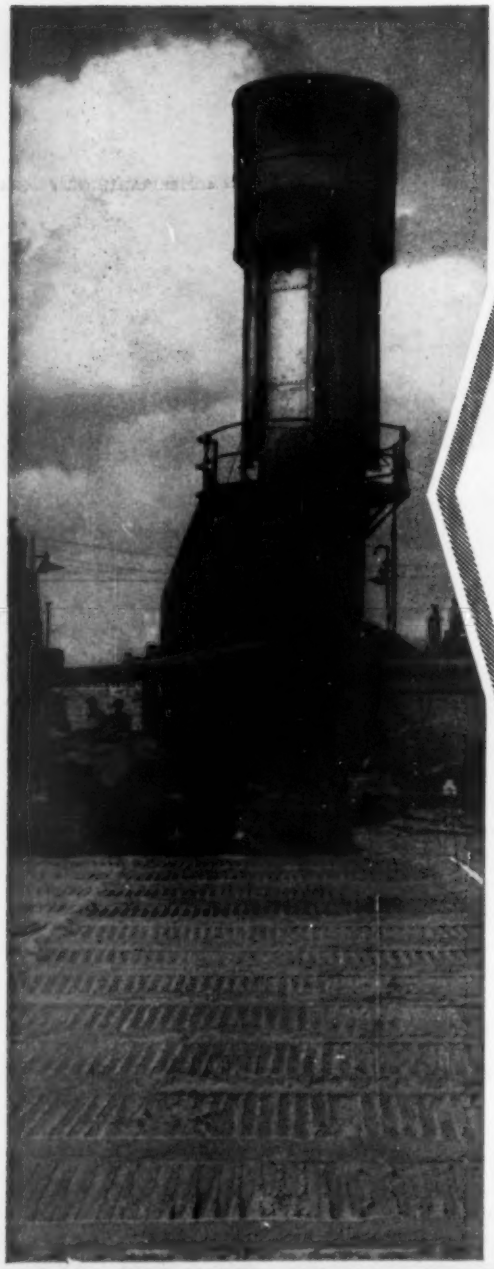

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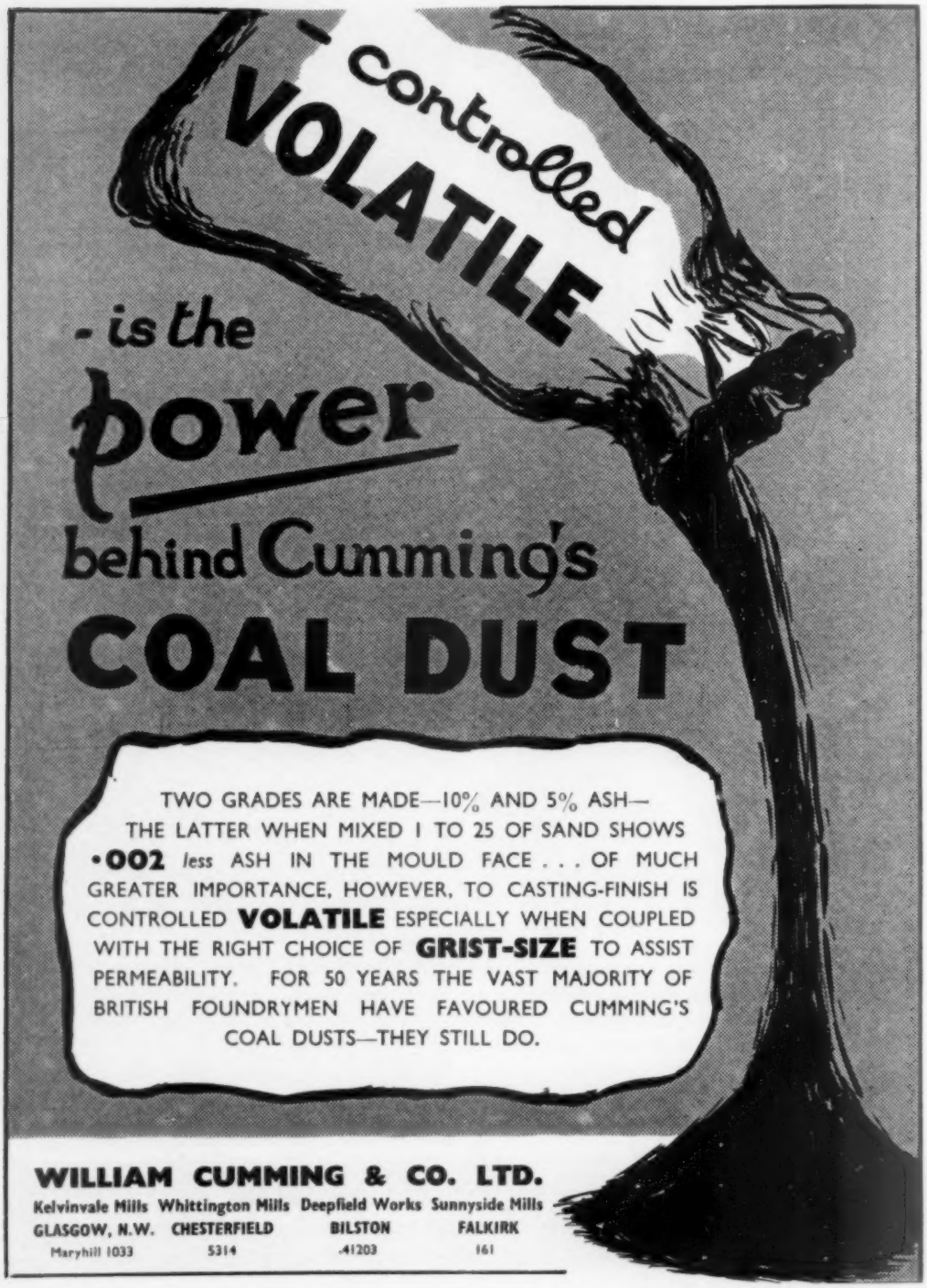
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TWO GRADES ARE MADE—10% AND 5% ASH—
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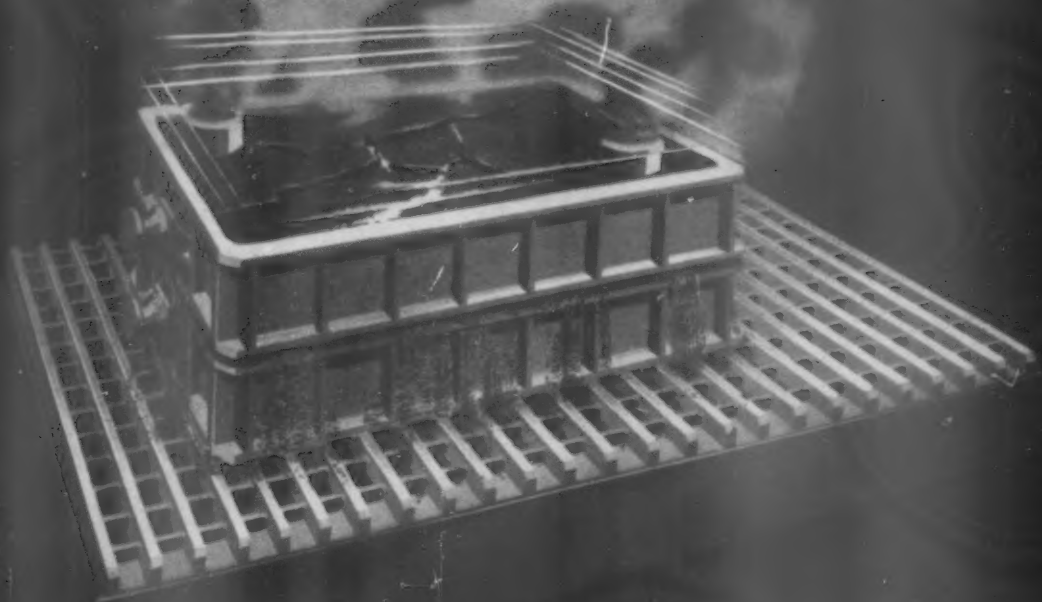

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MOULDING BOXES & SHAKE-OUT MACHINES

in use in more than 9000 foundries throughout the world

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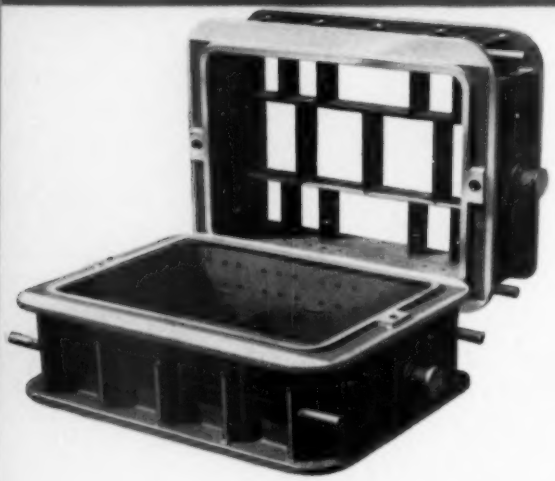
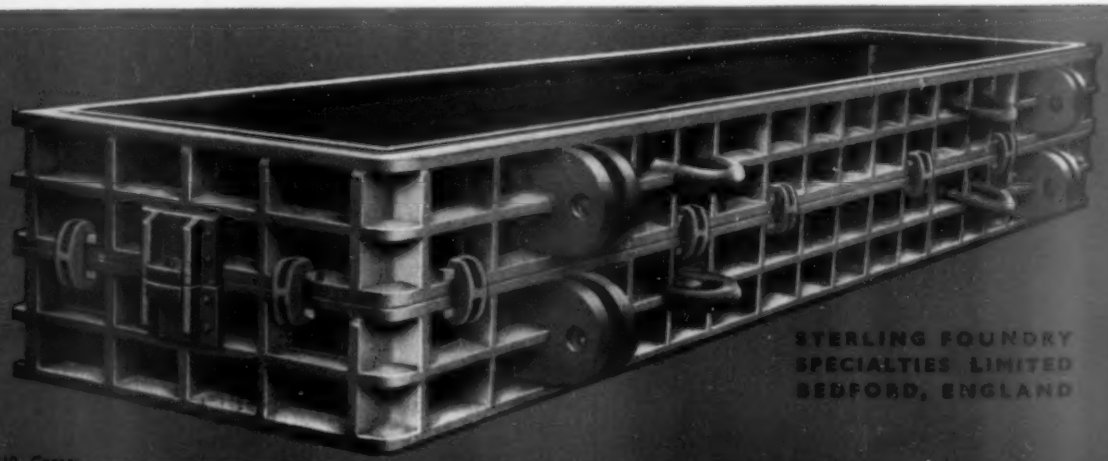
for very large and heavy work and for special applications



The two boxes (above and right) were part of two large orders for use on two semi-automatic plants in different foundries. Note the wide flanges giving great strength to resist high moulding pressures. The edges of the flanges are machined accurately in relation to the pin centres to provide accurate location against stops on the machines. The flanges are also machined underneath to provide roller paths.

The box below is 5 ft. 6 in. by 27 ft. 0 in. by 30 in., for dry sand work in a very large steel foundry. Note the heavy loop handles for crane lifting and also the semi-circular pieces on the sides to allow the box to be rolled over on the floor. The lugs at the far end of the box have slots.



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After seeing the Pangborn LK 6ft. Rotablast at the 1958 Foundry Exhibition they decided to instal this machine to replace an Airless Rotary Barrel which was limited to size and weight of castings it was able to clean.

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THE RESULTS . . .

1 Machine easily installed.
2 No Foundations required.
3 All Castings produced are now cleaned by machine.
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5 No Breakages of Thin Castings.
6 Considerable saving of shot.
7 Fettling keeps pace with output.
8 Perfectly clean Castings to customers on time.

Blasting time three minutes

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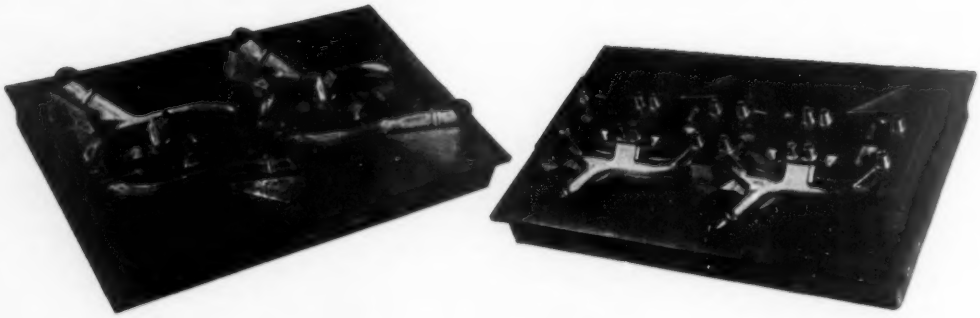

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This is why leading manufacturers rely on us for the utmost accuracy, economy and production technique in Wood and Metal Pattern Equipment engineered to fit the needs of your foundry.

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It is particularly suitable for the Automobile Industry and for all High Quality Castings.

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- ✓ Shockless jolt, nothing below ground.

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Empty box rolls in on gravity conveyor. Mould emerges on flanged rollers to clear "cods" or ram-up cores.

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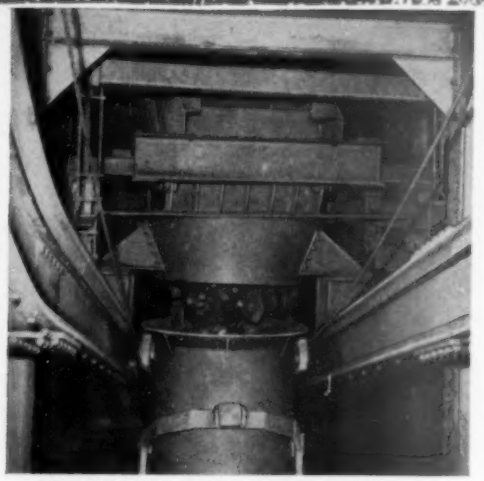
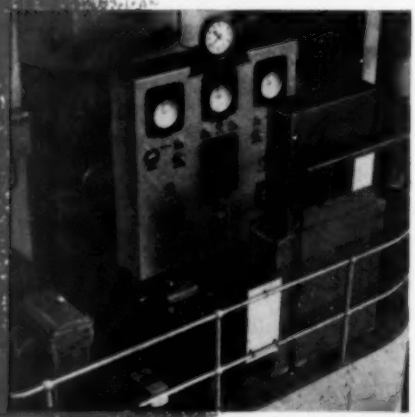
Headwork of swivel charger with power traverse for two 20-ton-per-hour cupolas.



Materials from floor weigh hopper discharging into a drop bottom bucket of swivel charger serving two 12-ton-per-hour cupolas.



Control panel for two 10-ton-per-hour cupolas.

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4 new leaflets

These features are described in greater detail in four new leaflets. Tick those which you would like to receive and pin this coupon to your letterheading.

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- ☐ FP. 2—Incandescent dust arresters.
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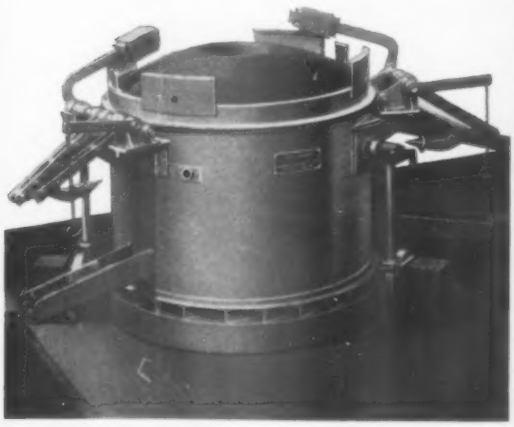
(*Below*) 15-ton oil-fired stationary receiver for a pair of 20-ton-per-hour cupolas.



Coke and limestone weigh hopper with automatic feeders and weigher for two 20-ton-per-hour cupolas.

(*Below*) Coke hopper, floor weigh hopper and stock bins, for swivel charger serving 8-ton-per-hour cupolas.

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Vol. 111 November 23, 1961 No. 2346

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Vol. 111 November 23, 1961 No. 2346

Cure for Foundry Myopia

Seldom does a craftsman receive such training that after a few years in industry he is able to keep abreast of recent technical developments to appraise their true worth, let alone the potential impact they have on the section of the industry in which he earns his living. Thus, it is interesting to learn that the Sheffield section of the National Trades Technical Societies is making a serious effort to remedy this situation using a novel technique which has much to commend it. Briefly, the idea is the organization of a course of 20 weekly discussion sessions, alternating with practical demonstrations to be held in nine of the city's leading foundries. The cost, at a shilling per night, is ridiculously cheap.

In this course, basic technical requirements of the modern foundryman have not been lost sight of, and instruction is to be given on the reading of drawings, patternmaking and the design of castings; foundry sands, methods of moulding and research and development. Demonstrations are being carried out in nine establishments—including the laboratories of the British Steel Castings Research Association, four predominantly steel and three iron foundries and one where both ferrous and non-ferrous castings are made. The foundries co-operating in this scheme make a wide diversity of products and all enjoy a world-wide reputation for quality. The opening meeting of this session's course was held last month, and opportunity was taken of inviting suggestions for the improvement of the course, proving that the curriculum is by no means stereotyped.

We can imagine no more valuable type of lecture than the one on the CO_2 Process, where the fundamental techniques are expounded, and, the following week, there is a visit to a works operating an up-to-date plant for the purpose. Again, on sand control, after a discussion on the regular carrying out of tests, there would follow a works demonstration showing the practical results achieved. There are many cases where this sensible system could be utilized for widening the technical horizon of the foundry operator and we suggest that other centres should emulate the lead given by Sheffield. By its very diverse nature, any individual working in the foundry industry must be confined to the carrying out of one or but a few operations and this is just the type of occupation which induces a sort of industrial myopia. For this, we can envisage no better cure than the explanation and practical demonstration of new plant and techniques.

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

CARBON-DIOXIDE PROCESS

SIR,—With reference to the article in your issue of November 2, page 537, the author is apparently unacquainted with the main source of information on the history of the CO_2 Process, as otherwise it would surely appear in his bibliography; he is not alone in this among writers on the Process.

The British Cast Iron Research Association held two conferences on this Process in March and May, 1956, attended by nearly 500 people. The reports presented, and discussions thereon, occupied the whole issue of over 100 pages of the Association's *Journal* for August, 1956, almost constituting a textbook. In one of the reports*, by Mr. J. R. Platt and Dr. D. W. F. Hardie, a most comprehensive account is given of the history of the Process, at the early experiments on which the former of these two authors assisted. The three Patents covering it are most comprehensive. The quotation of another author's reference to the advantages of the Process being freely available to all without restrictions stems from the fact that these Patents were half a century before their time, and of course, became time-expired. Many will disagree with the implication here that patented processes should be free for all, or that their development would be benefited thereby.

The paper mentioned gives portraits of the three inventors, the Hargreaves brothers and Andrew Poulson, together with a photograph of Poulson's house in which the early experiments were conducted. The implication in the article of November 2 that Poulson should have the whole credit is erroneous, but it is equally erroneous to describe him as a moulder. At the time of these experiments he was employed as a foundry supervisor. His attributes are well described in the Platt and Hardie paper and his inventive activities covered artificial rubber, the hot-blast cupola, corrosion inhibition, non-flam fabrics and fire-damp suppression in mines. The more important the CO_2 Process becomes, the greater is the credit due to these British inventors and errors about the origin of the Process should be eradicated in the literature before repetition makes the truth difficult to establish.—Yours, etc.,

J. G. PEARCE.

Birmingham.

* * *

BRAKE-DRUM PROBLEM†

SIR,—Referring to the letter on page 346 of your issue of September 21, we were surprised to learn that experienced founders are encountering defects similar to those which have recently bothered us. We have been manufacturing brake-drums for less than one year, but have had our fair share of snags during this period. It is hoped that our solution to some of these defects may assist "Drummer" to solve some of his difficulties.

In his illustrations "Drummer" does not indicate whether the microporosity occurs only in the region of the ingates or whether it is distributed around the circumference of the braking surface. In the former case the defect may be entirely due to the gating arrangements, while the latter case indicates a metal defect associated with higher phosphorus content.

We have found that the Connor feeder is best suited for brake-drum feeding. Our initial technique resembled that used by "Drummer" but we found, in heavier brake-drums, a porous area adjacent to the ingate furthest removed from the downgate. This defect was attributed to the forming of a local "hot spot" and was entirely removed by switching to a Connor feeder. It was found that microporosity occurred in several patches around the braking surface, but always in the region of the heaviest section, when the phosphorus content rose to a value above 0.2 per cent. An interesting feature was that the higher phosphorus was caused, not by the cupola charge intended for the brake-drum metal, but by the use of high-phosphorus scrap in charges which had been put through the cupola some time earlier. The combination of the Connor feeder and low-phosphorus content has completely eradicated the microporosity even from our heaviest brake-drums.—Yours, etc.

for Mangolds Engineering, Limited.
R. B. MCKECHNIE,
Works Manager.

P.O. Box 419,
Port Elizabeth.
October 23, 1961.

* * *

A FOUNDRY ENGINEERS' GROUP?

SIR,—As I was responsible for initiating the correspondence on this subject, I appreciate the results for it seems from the official comment of the IBF in the recent issue (JOURNAL, November 9) that the birth of this Engineers' Group is now imminent. I heartily endorse the remarks made by Mr. N. Taylor and suggest that if the FOUNDRY TRADE JOURNAL is willing, a national survey of engineers in the industry should be sought, running in parallel with IBF action as outlined in Mr. Lambert's letter. Whilst it is appreciated that the IBF boasts in its ranks many qualified engineers, it may be that many outside its present membership would swell its ranks if such opportunity offered, all in the interests of the scientific advancement of foundry engineering.

ENTHUSIASTIC ENGINEER (FOUNDRY).

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* Abstracted under: "Origin of the CO_2 Process," FOUNDRY TRADE JOURNAL, October 31, 1957, p. 517.

† Previously it was indicated that correspondence on this subject would be closed, but it was later considered undesirable to omit this useful contribution from South Africa bearing in mind that JOURNALS may take a matter of weeks to reach distant parts of the world by sea-mail—EDITOR.

Forthcoming Events

NOVEMBER 27

Institution of Plant Engineers

South Wales branch:—"Design for Maintenance," by R. N. Dale, 7 p.m., at the Electricity Showrooms, 62, Kingsway, Swansea.

Tyne Wear Metallurgical Society

Visit to the metals division of Vickers-Armstrongs (Engineers), Limited, Newcastle. (Details from secretary.)

NOVEMBER 28

Association of Bronze & Brass Founders

Scotland:—A special meeting, to be held at the St. Enoch Hotel, Glasgow, will be attended by the president, Mr. W. R. Buxton. The meeting will be preceded by a luncheon commencing at 12.30 p.m.

NOVEMBER 29

Institute of British Foundrymen

Southampton section:—"Origin, Detection, and Elimination of Gases," by D. V. Atterton, 7.30 p.m., at the Technical College, St. Mary's Street. (Joint meeting with the Southampton Metallurgical Society.)

DECEMBER 2

Institute of British Foundrymen

West Riding of Yorkshire branch:—"Art Founding," by A. L. Parrott, 6.30 p.m., at the Bradford Institute of Technology.

Wales & Monmouth branch:—"Influence of Mould Hardness on the Dimensional Stability and Soundness of Grey-iron Castings," by J. M. Greenhill, 6 p.m., at the Royal Hotel, St. Mary's Street, Cardiff.

Tin in Cast Iron

By D. A. Robins, B.Sc., Ph.D., A.Inst.P., F.I.M.

A striking development in recent years in the metallurgy of cast iron has been the increased use of small amounts of additives to the melt to control the structure and, therefore, the mechanical properties of the cast metal. The structure of cast iron can be altered markedly by the presence or absence in the melt of various trace elements and a considerable amount of information is now available on this subject. Particularly in the last 10 years, a number of workers have investigated the role of tin in various different types of cast iron and in the following paper an attempt is made to summarize and co-ordinate the published information.

Before the body of information discussed here was built up, unusual and unexplained properties in iron castings were sometimes obtained due, no doubt, to small variations in composition, and as long ago as 1933 Spencer and Walding[1] included tin additions in a study of the effects of eleven elements on the properties of a grey cast iron. This early work of Spencer and Walding was mainly concerned with mechanical properties and the percentages of tin employed were relatively large—0.25 and 1 per cent. The only structural effects noted by these workers was a slight tendency for these large amounts of tin to increase the chilling effect although more recent work has not confirmed this observation.

Structural Effects

The first indication that trace amounts of tin in a cast iron could produce significant changes in micro-structure was obtained in 1948 by the Bureau of Mines in Ottawa who investigated the cause of the unusual properties of certain melts of cast iron in which difficulty was experienced in obtaining ferritic structures by the usual ferritizing heat-treatments[2]. It was concluded from the results of this investigation that the increased stability of the pearlitic matrix present in these irons was probably due to the presence of tin in amounts of the order of 0.025 to 0.09 per cent.

The earliest systematic work in this field was reported by Morrogh[3] who included tin additions in a comprehensive study of the influence of some residual elements on the structure and properties of nodular cast iron. In the original patent by Millis, Gagnebin and Pilling[4] describing the process for the production of nodular cast iron by magnesium additions prior to casting, tin was included in a list of elements which were considered to interfere with the production of nodular graphite-structures. To test whether or not tin had a deleterious effect in this respect, Morrogh prepared a series of 10 nodular irons using a Swedish charcoal pig-iron which in the absence of tin gave a large percentage of ferrite in the matrix. The reported harmful effect of tin on the formation of nodular graphite was not confirmed. In fact it was shown that up to the maximum amount studied (0.13 per cent.), tin did not influence the structure of the graphite. The structure of the matrix, however, was changed markedly by the presence of tin. The addition of only 0.016 per cent. tin changed the matrix from one which was about 90 per cent. ferritic to a matrix with only 5 per cent. of free ferrite; 0.041 per cent. tin gave a fully-pearlitic structure with no free ferrite. It was concluded that tin is a strong pearlite promoter and that as little as 0.4 per cent. tin is more effective in producing pearlite than 0.95 per cent. of manganese. The work of Morrogh was followed up by De Sy and Foulon[5] who confirmed that tin additions suppress the formation of ferrite in a nodular iron without influencing the formation of nodular graphite. An iron which was approximately 80 per cent. ferritic in the as-cast condition in the absence of tin became fully pearlitic when 0.03 per cent. of tin was present. It was also noted that this promotion of a pearlitic matrix was not accompanied by any tendency to produce free cementite; no free cementite was observed in nodular irons containing up to 0.10 per cent. tin. Most of the work of De Sy and Foulon was concerned with nodular graphite irons but the results of a limited amount of work on a flake iron was also reported. A flake iron with a tin content of 0.048 per cent. was found to have a fully-pearlitic matrix whereas the corresponding iron without a tin addition contained approximately 20 per cent. of free ferrite around the graphite flakes.

Flake Irons

A more extensive study of the structural effects of tin in flake irons was undertaken by Davis, Krause and Lownie[6] at the Battelle Memorial Institute in which additions of up to about 0.5 per cent. tin were made both to an automotive-type hypoeutectic and to a general-purpose hypereutectic grey iron. The results of Davis and his co-workers' showed that the minimum quantity of tin necessary to produce a fully-pearlitic matrix was dependent on the composition of the base iron. In the hypoeutectic iron the percentage of pearlite in the micro-structure was increased from about 80 to 100 per cent. by the addition of 0.1 per cent. tin whereas in the hypereutectic iron 0.5 per cent. tin was required completely to convert to pearlite the 50 per cent. of ferrite present in the base iron. The addition of

* Chief Metallurgist, Tin Research Institute.

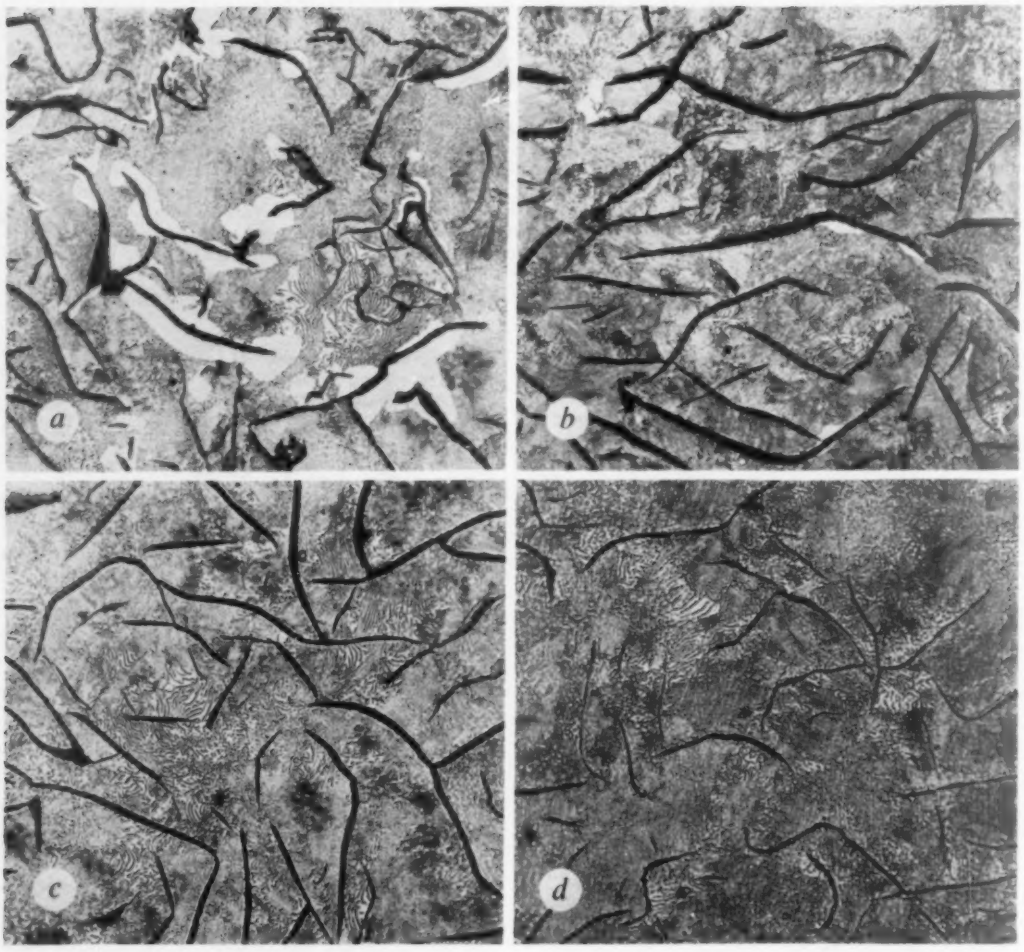

FIG. 1—(*a*) *Hyper-eutectic cast iron without tin addition* (3.7 *per cent. C*, 2.45 *per cent. Si*, 0.65 *per cent. Mn*); (*b*) *with* 0.06 *per cent. tin*; (*c*) *with* 0.1 *per cent. tin*; (*d*) *with* 0.3 *per cent. tin*. × 250.

only 1 per cent. of tin to the hypereutectic iron, however, increased the amount of pearlite from 50 per cent. to approximately 90 per cent. In addition to the laboratory investigation, Davis and his co-workers also carried out a number of tests in commercial foundries with similar results. An example of the structural changes produced by tin in a flake iron is shown in Fig. 1. The base iron, cast at the Tin Research Institute, contained 3.7 per cent. carbon, 2.45 per cent. silicon, 0.65 per cent. manganese and the addition of 0.06 per cent. tin left very-little residual ferrite. With 0.1 per cent. tin the matrix was fully pearlitic and three times this quantity of tin did not produce any massive cementite. In a hypoeutectic iron containing 3.33 per cent. carbon, 2.08 per cent. silicon and 0.64 per cent. manganese the addition of 0.06 per cent. tin gave a fully pearlitic matrix.

Section Thicknesses

In subsequent work by Williams, Keyser and Lownie, reported by Ellwood[7], tin additions were made to two different nodular irons, the compositions of which were selected to give different amounts of free pearlite around the graphite nodules. To determine the effect of casting section in relation to tin additions, sections were cast varying in thickness from 0.5 to 3 inches. The results showed that the structural effects of tin are not sensitive to section thickness and again the strong pearlite promoting effects of small additions of tin were observed. Although between 0.1 and 0.2 per

cent. of tin was necessary to remove the last traces of ferrite, the addition of 0.05 per cent. tin to an iron with approximately 30 per cent. of free ferrite reduced the amount of free ferrite to about 4 per cent. (Fig. 2). The same percentage of tin when added to a nodular iron containing approximately 40 per cent. of ferrite resulted in a matrix which was 90 to 95 per cent. pearlitic. It is of interest that one of the base irons examined gave a certain amount of massive cementite when cast in 0.5-in. sections but even with 0.37 per cent. tin the amount of chill produced did not increase. This relatively large amount of tin did not influence the formation of nodular graphite in any of the section thicknesses examined (½, 1 and 3 in.).

The results of an extensive investigation into the effects of various amounts of tin up to 0.25 per cent. on nodular irons of different silicon contents has recently been published[5] and, in addition to confirming the strong pearlite promoting action of tin, it was again shown that this is achieved without producing massive cementite. No chill was found even in irons containing 0.25 per cent. tin. Tin did not inhibit the formation of graphite nodules and, in fact, the perfection of the nodules was greater in the iron containing tin than in the tin-free material.

Structural Stability

The effect of small amounts of tin in modifying the structure of both grey and nodular irons of widely different compositions so as to give a fully-pearlitic matrix in the as-cast condition is therefore now well established but, as yet, there is only a limited amount of data on the effect of tin on the stability of the pearlite so produced. It might be expected that an element with such a strong pearlite promoting effect might also increase the stability of the pearlite during heat-treatment and this has been observed particularly for nodular irons. In an investigation of the effect of composition on the structural stability of both flake and nodular irons Gilbert[7] found that a nodular iron with 0.085 per cent. tin showed no evidence of structural break-down after 64 weeks at 500 deg. C. This is in contrast to the same iron without tin which was already 70 per cent. ferritic in the as-cast condition and after heat-treatment structural break-down was complete. It is of interest that a similar iron with 0.065 per cent. arsenic which is, like tin, a pearlite promoter also showed complete structural break-down after the heat-treatment at 500 deg. C. The increased stability of pearlite in a nodular iron containing tin found by Gilbert has been confirmed by as yet unpublished results obtained at the Tin Research Institute. Nodular cast irons of different silicon and tin contents were examined metallographically before and after a ferritizing heat-treatment of 6 hours at 900 deg. C., followed by 72 hours at 690 deg. C., a treatment which in the absence of tin gave a fully ferritic matrix.

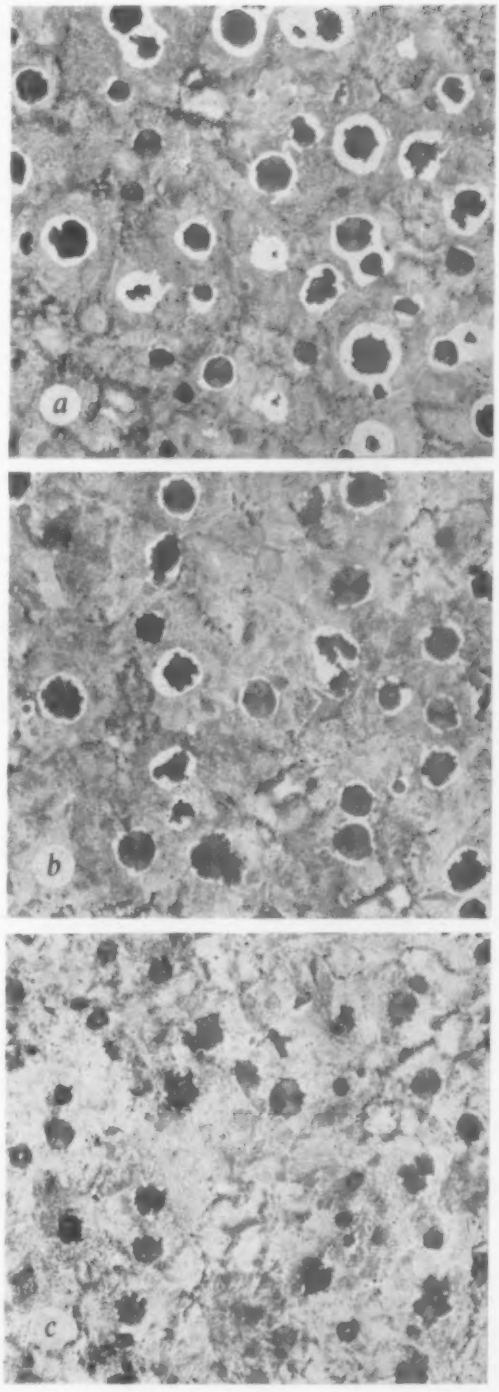

FIG. 2.—(*a*) *Nodular cast iron without tin addition* (3.5 *per cent. C*, 2.37 *per cent. Si*, 0.51 *per cent Mn*); (*b*) *with* 0.036 *per cent. tin*; (*c*) *with* 0.05 *per cent. tin.* ×100.

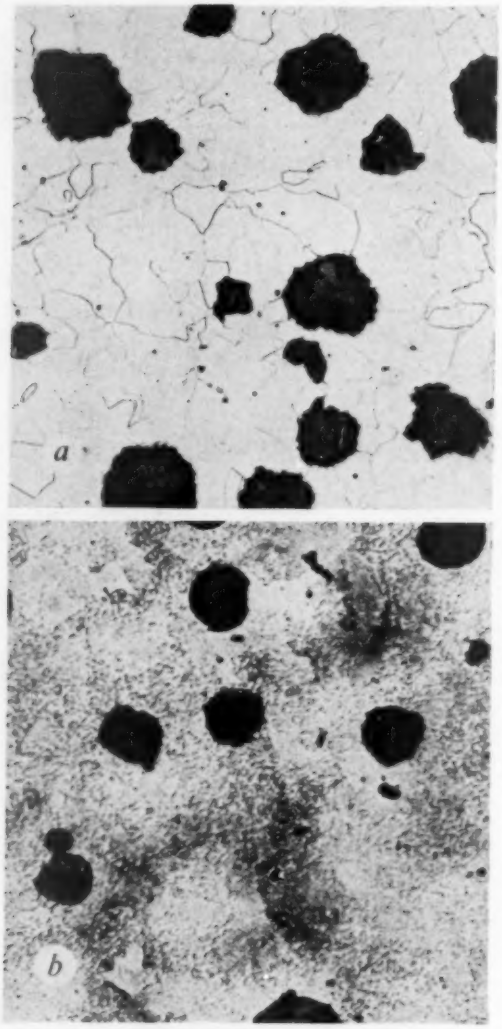

FIG. 3.—(*a*) *Nodular cast iron* (1.4 *per cent. Si*) *after ferritizing treatment, without tin addition;* (*b*) *with* 0.11 *per cent. tin.* × 250.

Increasing the tin content progressively increased the amount of residual pearlite after heat-treatment and, although 0.25 per cent. tin was required in an iron containing 2.5 per cent. silicon to retain a fully pearlitic matrix, 0.1 per cent. tin was sufficient to prevent any structural break-down in a 1.4 per cent. silicon cast iron (Fig. 3). The evidence of the effect of tin on the structural stability of pearlite in flake irons at elevated temperatures is both incomplete and rather contradictory. As already mentioned, work carried out by the Bureau of Mines, Ottawa in 1948[2] indicated that 0.025 to 0.09 per cent. tin made it difficult to produce a ferritic matrix under normal ferritizing conditions and in a recent patent[10] concerning the use of tin as a constituent in a master alloy for the production of high-grade flake irons, one of the advantages claimed is that the inoculant stabilizes the pearlite at elevated temperatures. Gilbert[8] found, however, that in a flake iron containing 0.06 per cent. tin, structural break-down was complete after 64 weeks at 500 deg. C. At 450 deg. C., on the basis of the growth characteristics, the same iron showed some enhancement in the pearlite stability as compared with a similar iron without tin. It seems likely that in flake irons as in nodular irons, tin not only promotes a fully-pearlitic structure but also enhances to some extent the elevated-temperature stability of the pearlite. Other factors, however, such as, for example, the size and distribution of the graphite flakes and the composition of the base iron, may be of greater importance in this type of iron. The effects of tin on the structure of cast iron may be summarized as follows. Tin is a powerful pearlite promotor in both flake and nodular irons even when the carbon equivalent value is relatively high. The addition of a small percentage of tin, of the order of 0.1 per cent., will ensure a fully-pearlitic structure and even if this concentration is exceeded the tin will not promote the formation of free cementite. The presence of tin does not interfere with the formation of nodular graphite and may, in fact, improve the perfection of the graphite nodules. A small percentage of tin in a nodular iron increases considerably the elevated temperature stability of the pearlite matrix and it probably has a similar but less-pronounced stabilizing effect in flake irons.

Mechanical Properties

The mechanical properties of cast iron are very dependent on structure and, therefore, an element such as tin which can change so markedly the structure of a casting, can also have a large effect on mechanical properties. Any change in mechanical properties produced by tin in this way is, of course, structurally determined rather than the direct result of tin in solution in the iron. The presence of only a trace amount of tin in solution in the iron is likely to have a much-smaller influence on properties than the structural changes and in most of the published work no attempt has been made to distinguish between the two effects. An exception to this, however, is the work of Prytherch and Gilbert[8] in which the nodular irons studied were almost completely pearlitic without the addition of tin so that the change in properties produced by tin additions were primarily due to tin in solid solution. The change in properties associated with changes in structure will be considered first.

Structural Effects

The early work of Spencer and Walding[1] who added 0.25 and 1 per cent. tin to two different base flake irons, found that, at these relatively-high concentrations the presence of tin reduced both

the ultimate tensile strength and the impact strength of cast material, the latter being affected most. The Brinell hardness increased progressively with increasing tin content. The most extensive information on the mechanical properties of flake irons containing tins are those given by Davis and his co-workers[5] who studied five levels of tin varying from 0.01 to 0.5 per cent. in both an automotive-

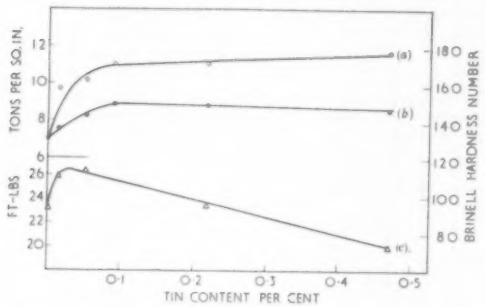

FIG. 4.—*Effect of tin additions on the mechanical properties of a hypereutectic flake iron.*

Key:—(*a*) Brinell hardness, (*b*) ultimate tensile strength, (*c*) impact strength.

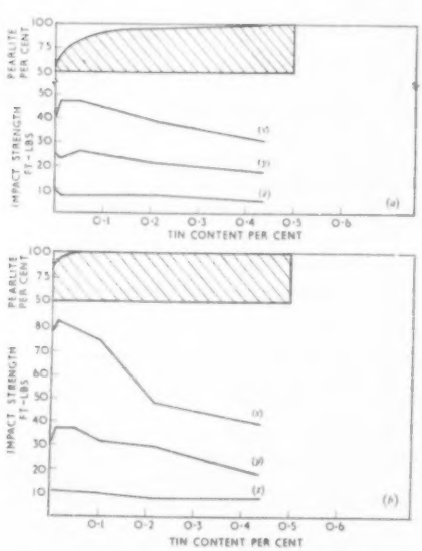

FIG. 5.—*Effect of tin additions on the impact strength of a hypereutectic and hypoeutectic flake iron.*

Key:—(*a*) Hyper-eutectic iron, (*b*) hypo-eutectic iron. Specimens, (*x*) 1.5-in. dia., (*y*) 1.25-in. dia., (*z*) 0.75-in. dia.

type hypoeutectic flake iron and a general-purpose hypereutectic flake iron. For detailed results the original paper should be consulted but the effect of tin additions on the tensile strength, Brinell hardness and impact resistance obtained with 1.2-in. dia. test bars for the hypereutectic iron are summarized in Fig. 4. In both irons the tensile strength increased with increasing tin contents up to about 0.1 per cent. and then remained approximately constant with higher concentrations. The hardness also increased with increasing tin content levelling off at the higher concentrations. The mpact strentgh increased slightly for both irons with small tin additions but larger amounts of tin progressively reduced the impact strength; the extent of the decrease was greater for the hypoeutectic iron than for the hypereutectic iron. It is of importance, however, that for both irons and for a range of different size test pieces, the impact resistance of material containing 0.1 per cent. tin was no lower than that of the base iron (Fig. 5). As has already been pointed out, this amount of tin was sufficient to convert an 80 per cent. pearlitic structure to a fully pearlitic structure in the hypoeutectic iron and, in the hypereutectic iron to convert a 50 per cent. pearlitic structure to 90 per cent. pearlitic. No doubt below about 0.1 per cent. tin the main factor influencing mechanical properties is the structural change resulting from the presence of tin whereas at higher concentrations the direct effects of tin are likely to be of increasing importance. A rather more limited investigation of the mechanical properties of two irons of similar basic composition to those studied by Davis and his co-workers and containing tin in amounts up to 0.3 per cent. tin, has recently been completed at the Tin Research Institute. The results both from the point of view of structure (Fig. 1) and mechanical properties (Table 1) are in good agree-

TABLE 1.—*Effect of Tin on the Mechanical Properties of Two Different Flake Cast Irons.*

Tin content (per cent).	U.T.S. (tons per sq. in.).	Hardness.
Hypo-eutectic iron		
0	11.6	170
0.045	13.8	213
0.10	15.0	221
0.31	15.5	230
Hyper-eutectic iron		
0	10.0	145
0.05	9.4	175
0.07	10.0	183
0.25	10.7	206

ment with the previous work although rather less free ferrite was found in the base hypereutectic iron than was obtained by the American workers and 0.1 per cent. tin was sufficient to give a fully pearlitic matrix. Gilbert[9] has reported the change in mechanical properties produced by the addition of 0.06 per cent. Sn to a base iron containing 3.25 per cent. carbon, 1.58 per cent. silicon and 0.65 per cent. manganese and he found that this amount of tin increased the tensile strength from 16.6 tons per sq. in. to 18.6 tons per sq. in., increased the Brinell hardness from 213 to 228 and did not change the Charpy impact value (8.8 and 8.9 ft.-lb. respectively).

Turning now to nodular irons, Morrogh[3], determined the change in mechanical properties pro-

Tin in Cast Iron

duced by the addition of tin to a nodular iron prepared from Swedish charcoal pig-iron so that the matrix of the base iron was mainly ferritic (90 per cent.). As was to be expected, he found that the change in structure produced by the tin was reflected in the mechanical properties (Fig. 6). The harder, less-ductile pearlitic matrix produced by as little as 0.022 per cent. tin increased the tensile strength and hardness from 28 tons per sq. in. and 156 Brinell to 44 tons per sq. in. and 249 Brinell respectively with a corresponding reduction in elongation from 13 to 4 per cent. Larger quantities of tin had little further effect on properties although there was some small increase in hardness and decrease in the strength and ductility. This work of Morrogh on a base iron containing 3.49 per cent. carbon, 2.08 per cent. silicon and less than 0.02 per cent. manganese was to a large extent repeated by De Sy and Foulon[5] on a nodular iron higher in carbon and manganese (3.75 to 4.0 per cent. carbon, 1.8 per cent. silicon, 2.10 per cent. manganese). Again a Swedish charcoal pig-iron was employed so that the base iron without tin was largely ferritic. As had been found by Morrogh, the tensile strength and hardness increased rapidly with the addition of a small percentage of tin accompanied by a corresponding decrease in ductility. 0.03 per cent. tin gave a fully pearlitic matrix producing an increase in tensile strength from 27 tons per sq. in. to 43 tons per sq. in. with a reduction of elongation from 8 to 3 per cent.

The Battelle work reported by Ellwood[7] included mechanical properties data for three different casting sections and the values obtained for 1-in. sections are typical (Table 2). In fact, the effect of tin was similar for each size of section although the section size had a general influence on the properties of the irons both with and without tin additions, the hardness increasing with decreasing section as would be expected. The tensile strength of the nodular irons increased to a maximum with increasing tin content and then decreased with further additions of tin. The decrease in strength from the optimum value was not produced, however, until the amount of tin required to give a pearlitic matrix had been exceeded.

Gilbert[8], who investigated only one level of tin in a nodular iron prepared from a Swedish pig-iron found an increase in strength from 38 to 42 tons per sq. in. and an increase in hardness from 191 to 244 Brinell coupled with a decrease in elongation from 11 to 3 per cent. The elevated temperature stability imparted to the pearlite by the presence of tin was reflected in the room temperature mechanical properties after heat-treatment at 500 deg. C.

TABLE 2.—*Effect of Tin on the Mechanical Properties of Two Different Nodular Cast Irons.*

Tin content (per cent.).	U.T.S. (tons per sq. in.).	Elongation (per cent.).	Hardness.
3.52 per cent. C, 2.37 per cent. Si, 0.51 per cent. Mn			
0.003	44.3	6.8	224
0.05	51.3	4.6	260
0.13	51.0	3.3	267
0.37	42.8	1.3	296
3.42 per cent. C, 2.54 per cent. Si, 0.51 per cent. Mn			
0.003	42.8	7.2	216
0.13	45.9	2.2	278
0.37	39.6	1.2	297

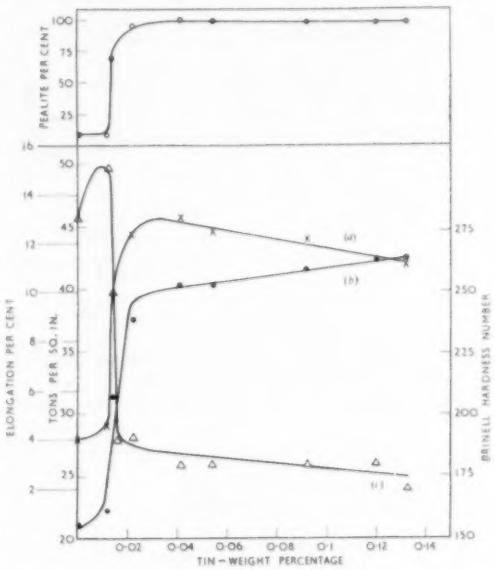

FIG. 6.—*Effect of tin additions on the mechanical properties of a nodular iron.*

Key:—(*a*) Ultimate tensile strength, (*b*) Brinell hardness number, (*c*) elongation.

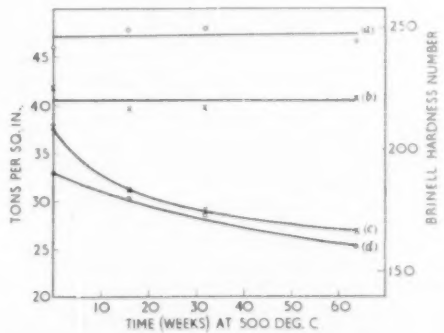

FIG. 7.—*Room-temperature mechanical properties of a nodular iron with and without tin after different times of treatment at 500 deg. C. in air.*

Key:—(*a*) and (*d*) Brinell hardness number, (*b*) and (*c*) ultimate tensile strength. (*a*) and (*b*) relate to irons containing 0.085 per cent. Sn; (*c*) and (*d*) without Sn.

(Fig. 7). The strength of the iron containing tin remained unchanged whereas that of the base iron

decreased with the progressive breakdown of the pearlite. The elongation of the iron with 0.085 per cent. remained constant with increasing time of treatment in contrast to that of the tin-free material which showed a progressive increase in ductility. It should be pointed out that, under the conditions of heat-treatment, an iron without tin but made from a refined-iron charge retained its mechanical properties to almost the same extent as the tin-containing material. It is to be expected, however, that had a comparison been made between an iron with and without tin both of which had been prepared from a refined-iron charge, the presence of tin would show up to advantage under more severe temperature conditions. The experience of the Tin Research Institute already referred to (Fig. 3) in which treatments at 690 deg. C. were investigated would support this conclusion.

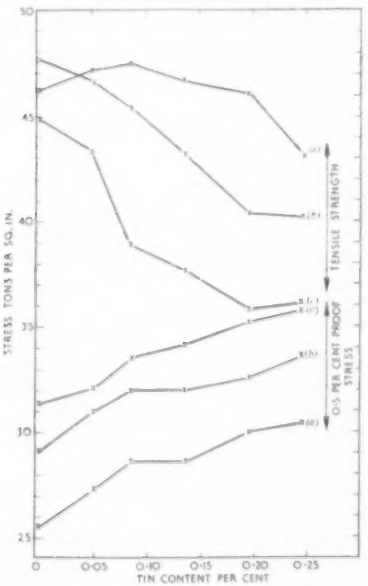

FIG. 8.—*Effect of tin additions on the mechanical properties of pearlitic nodular irons in the as-cast condition.*

Key: Silicon series—(*a*) 1.4, (*b*) 1.9, (*c*) 2.5 per cent.

Direct Effects

The first serious attempt to distinguish between the structural influence of tin on mechanical properties and the direct effect of tin in solution in the iron was made by Gilbert[11]. He compared the mechanical properties at room temperature and 100 deg. C. of two nodular irons both of which were fully pearlitic, one contained 0.1 per cent tin and the other was rendered pearlitic by the addition of copper. At room temperature the iron with the tin addition had a rather lower strength and ductility but at 100 deg. C. the difference in properties was considerably reduced. Both irons were tested in the as-cast condition. This apparent embrittling effect of tin in a fully-pearlitic nodular iron has since been investigated thoroughly by Prytherch and Gilbert[7] both for as-cast and normalized material. In this work, in addition to determining the tensile properties and hardness of irons with different amounts of tin, impact strengths in the temperature range −100 to +200 deg. C. were measured so that information was obtained on the variation in the ductile-to-brittle transition temperature with tin content. This was done for three different silicon levels since it is known that, in certain pearlitic-nodular cast irons, silicon raises the transition temperature[12]. In both as-cast and normalized irons it was found that the addition of tin progressively increased the proof stress and the hardness and in all the irons the proof stress and hardness after normalizing were considerably greater than in the as-cast material. The increase in 0.5 per cent. proof stress for each 0.1 per cent. of tin was about 1.5 and 3.5 tons per sq. in. in the as-cast and normalized irons respectively. In both as-cast and normalized material the hardness increased by about 18 points Brinell for each 0.1 per cent of tin added. The effect of tin on the tensile strength, however, was rather more complex and was shown to be related to changes in the ductile-to-brittle transition temperature produced by tin and silicon (Figs. 8 and 9). In as-cast material the addition of a small percentage of tin increased the tensile strength of an iron with a relatively-low silicon content (1.4 per cent.) but further quantities of tin reduced the strength. In as-cast irons with higher silicon contents tin additions progressively reduced the tensile strength. After a standard normalizing treatment, however, the toughness of the irons increased and irons embrittled in the as-cast condition by 0.1 per cent. tin or less, had normal tensile strengths, after heat-treatment. It was concluded, therefore, that the presence of sufficient tin to ensure a fully pearlitic structure in a nodular iron which might otherwise contain free ferrite (up to 0.1 per cent. tin) will not have an undesirable effect on mechanical properties after the iron has been normalized.

Conclusions

From the available evidence on the mechanical properties of both flake and nodular irons containing tin it can be concluded that, for small percentages of tin up to about 0.1 per cent., the change in mechanical properties produced by tin is largely due to the resulting structural changes. Additions of tin in excess of that required to give a fully-pearlitic matrix may be undesirable in applications where impact strength is important, particularly when the silicon content is also high. The tendency for unnecessarily large amounts of tin to produce some degree of embrittlement is of less significance in flake irons than in nodular irons since the presence of the graphite flakes, making all flake irons essentially brittle materials, will mask the small effects of tin.

Tin in Cast Iron

Growth Resistance

Since the growth of a cast iron at elevated temperatures is associated with structural breakdown of pearlite some guide to the influence of tin additions on growth can be gained from the work already discussed on the stabilizing effect of tin on pearlite. The only direct experimental results on the effect of tin additions on growth are those of Gilbert[8] in which the growth of a flake iron with and without 0.06 per cent. tin and of a nodular iron with and without 0.085 per cent. tin was investigated at a range of temperatures up to 500 deg. C. Growth did not occur in any of the irons at temperatures up to 400 deg. C. In the flake iron tin was found to have a small beneficial effect on growth at 450 deg. C. producing a reduction in growth of about 30 per cent. after 64 weeks but at 500 deg. C. 0.06 per cent. tin decreased the rate of growth only slightly. In the nodular iron, however, 0.085 per cent. tin produced a remarkable reduction in growth at both 450 and 500 deg. C. and gave the best growth properties of all the as-cast nodular irons tested (Fig. 10). This is in contrast to the effect of arsenic or copper both of which are pearlite promoters but were not pearlite stabilizers in the irons tested. The increase in growth over the base iron shown by the irons containing these additives is, of course, associated with the larger amount of pearlite available for breakdown and if tin had not had such a large stabilizing effect on pearlite, the curve for the iron with 0.085 per cent. tin would have corresponded to the curves for the arsenic- and copper-containing irons rather than that for the base iron which contained 70 per cent. of free ferrite. To obtain a pearlitic nodular iron with good growth properties at even higher temperatures than 500 deg. C. therefore, it would seem desirable, from the results of Gilbert[8] on irons made from different pig-irons and from the observed structural effect of tin, to use a refined-iron charge, to have a relatively low silicon content and to add about 0.1 per cent. tin.

Oxidation Resistance

The only information on the effect of tin on the oxidation resistance of cast irons is again due to Gilbert[8]. 0.06 per cent. tin in a flake iron did not influence the scaling resistance of the iron at 450 deg. C. or below but at 500 deg. C. tin had a very beneficial effect. After 64 weeks at 500 deg. C. in air this small percentage of tin had reduced the increase in weight resulting from oxidation by almost half. In fact 0.06 per cent. tin had considerably more effect than the simultaneous addition of 0.6 per cent. chromium and 1.1 per cent. nickel. In a nodular iron, however, the presence of 0.085 per cent. tin did not alter the oxidation resistance at any of the temperatures investigated but it should be borne in mind that the oxidation resistance of nodular iron is markedly superior to that of flake iron. The nodular iron with or without tin had a scaling resistance comparable to that of the flake iron with 0.06 per cent. tin. General conclusions on the effects of tin on oxidation resistance of cast iron cannot be drawn from the limited amount of information so far available, but further work is now in progress on the oxidation resistance of both flake and nodular irons of different tin and silicon contents.

Summary and Conclusions

Quite small concentrations of tin in cast iron can have a remarkably large effect on the structure of the iron with corresponding changes in mechanical properties. In both flake and nodular irons tin is a strong pearlite promoter and the presence of about 0.1 per cent. or even less, will ensure that a fully-pearlite matrix is obtained.

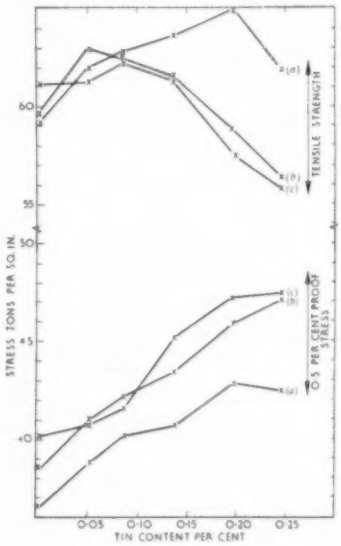

FIG. 9.—*Effect of tin additions on the mechanical properties of pearlitic nodular irons after normalizing.*

Key:—Silicon series—(*a*) 1.4, (*b*) 1.9, (*c*) 2.5 per cent.

In an iron, therefore, which, in the absence of tin, would contain ferrite in the matrix, the addition of a small percentage of tin will increase markedly the tensile strength, hardness and wear resistance with a corresponding reduction in ductility. This decrease in ductility, is, of course, associated with the structural change; high strength and low ductility are characteristic features of a pearlitic iron. In flake irons the addition of tin in amounts in excess of that required to give a fully-pearlitic matrix does not change the properties markedly although further increases in hardness are obtained and when large amounts of tin are present the strength starts to fall. In as-cast nodular irons, particularly if the silicon content is

high, the addition of tin to an iron which is already fully pearlitic may reduce tensile strength and relatively-high tin contents coupled with high silicon may be undesirable for certain applications. In the normalized condition, however, 0.1 per cent. tin can be added to control structure without undesirable side effects irrespective of the silicon content in the range investigated (1.4 to 2.5 per cent.).

Unlike carbide stabilizing elements, such as, for example, chromium, tin promotes the formation of pearlite without increasing the tendency to form massive cementite even in amounts in excess of that required to give a fully-pearlitic matrix. The presence of tin does not inhibit the formation of nodular graphite in a nodular iron irrespective of the section thickness and tin may, in fact, improve the perfection of the nodules.

In addition to promoting a pearlitic structure on casting, tin also increases the stability of the pearlite at elevated temperatures particularly in nodular irons. In this type of material, therefore, tin reduces growth at elevated temperatures and mechanical properties are maintained. From the

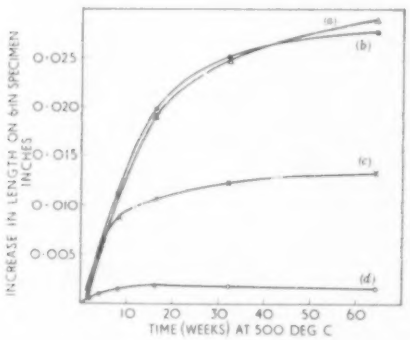

FIG. 10.—*Growth properties at 500 deg. C. in air of a nodular cast iron with different pearlite promoting additives.*

Key:—(*a*) 0.065 per cent. As, (*b*) 0.8 per cent. Cu, (*c*) no addition, (*d*) 0.085 per cent. Sn.

limited amount of comparative data available it would appear that 0.085 per cent. tin has more effect on the growth resistance of a pearlitic nodular iron than considerably larger quantities of chromium and molybdenum[9].

An additional aspect of the effect of tin which, as yet, has received only a limited amount of attention is its influence on oxidation resistance at elevated temperatures but the information which is available suggests that the addition of a small percentage of tin to a flake iron will reduce the oxidation rate to that usually associated with a nodular iron.

Adding Technique

In foundry practice the use of tin presents no difficulty since it can be added in the ladle as a small piece of solid tin when the tin melts instantly and is rapidly dispersed throughout the molten iron; a foundry which has been using tin additions to control the structure and properties of their castings for a number of years has found that stirring after the addition of tin to be unnecessary[10]. In this particular application where wear resistance and uniform hardness were important, the use of 0.08 per cent. tin to control structure gave higher and more consistent hardness values. The ability to use tin as a ladle addition is likely to be of importance since it enables a foundry to treat relatively-small quantities of metal at a time. Only castings which require to have a fully-pearlitic structure need, therefore, be treated and if, for example, a subsequent melt is for castings to receive a ferritizing treatment, tin can be omitted.

Due, no doubt, to the newness of much of the information on the effects of small amounts of tin in cast iron, the potentialities of tin as an additive are not, as yet, being fully exploited. It is hoped that the information summarized in this paper will enable the technical merits of tin additions for a particular application to be assessed.

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Export Council for Europe Convention

The Export Council for Europe is this year holding its National Convention at Eastbourne from November 29 to December 2. The theme will be "Selling to Europe" and all practical means of further expanding British exports to Europe will be explored. Delegates will be placed in groups by industries, the groups including heavy engineering and transport, electrical and electronic engineering, producers' goods, metals and components of all kinds—ferrous and non-ferrous; machinery, light engineering, etc. There will be three plenary sessions and two main working sections. In one section opportunities for British traders spotlighted by the Council fact-finding missions during the year will be discussed. The second section will be concerned with subjects of a more general nature including transport, exhibitions and market research.

The Prime Minister has agreed to be the guest of honour at the banquet on the Friday evening at the Grand Hotel, and the Chancellor of the Exchequer, the Rt. Hon. Selwyn Lloyd, Q.C., M.P., will address the opening plenary session. The opening address will be given by the chairman of the Council, Sir William MacFazdean, and the summing up by Sir Norman Kipping, director general of the Federation of British

Rheumatism in Industry

The second Congress of Rheumatic Diseases in Industry was held on November 2 at the New York University School of Medicine, USA, in co-operation with the New York State Society of Industrial Medicine. One of the papers presented was given by Dr. J. J. R. Duthie (senior lecturer of Edinburgh University and director of the rheumatic diseases unit, Northern General Hospital, Edinburgh), and Dr. J. A. D. Anderson (medical officer in charge of the Empire Rheumatism Council Industrial Survey Unit, Northern General Hospital). The title of the paper was "Social and Economic Effects of Rheumatic Disease with particular reference to Working Capacity," and foundry workers were included in the survey described.

The authors stated that interviews and examinations had been conducted on 320 male workpeople in four types of industry—foundry workers, brewery workers, printers and bookbinders, and shop assistants. The figures showed 54 per cent. "positives" and 17 per cent. "intermediates" for foundrymen, as compared with 42/6, 47/12, and 44/11 for brewers, printers and shop assistants respectively. Though the variation between different occupations suggested a higher prevalence of the disease in foundry workers, it was apparent that this was due largely to differences in the age distribution of those examined. If correction were made for age, the "positive" rate for foundry personnel would be reduced to 49 per cent. and brewers increased to 45 per cent.

The authors considered that a study of occupational and environmental factors might have an important bearing on the incidence of rheumatism in the working population, as many forms of the disease might be related to occupational factors. For this reason, it was felt that this might be a fruitful field of research, of interest both to the medical profession and to employers of labour, and the objectives of the Empire Rheumatism Industrial Survey Unit under Dr. Duthie at Edinburgh were given as:—to gain a more accurate picture of the prevalence of rheumatism in specific industries; to estimate the financial implications to both employee and employer; to investigate the importance of conditions at work; to examine processes with a view to advising employers how the incidence might be reduced, and to designate occupations which could be efficiently performed by workers already partially disabled by rheumatism. The survey, which has been started recently, is to continue for three years.

Bulgarian Technology

The September, 1961, issue of the Bulgarian journal, *Mashinostroene*, contains amongst its other items, two articles of interest to foundrymen. The first is entitled "Bentonite at Kurdjali as a Binding Material in Founding," by G. Angelov, Y. Jijev and P. Ivanov, and gives the results of prospecting carried out on the clay deposits at Kurdjali. The article states that these clays possess good binding properties and can be widely used in foundrywork. Many tables and graphs are included to illustrate the research carried out by the authors. The second article is entitled "Effect of Homogenizing Cooling on the Resistance to Corosion by Spheroidal-graphite Cast Iron," and is written by R. Todorov, and G. Koshovnik.

Other items in this issue deal with laboratory examination of the wear and tear of ploughshares and a method of determining the efficient capacity of ball-crushers as a function of the friction between the load of balls and the lining.

Dinner

ASSOCIATION OF LIGHT ALLOY REFINERS AND SMELTERS

Good food, good fellowship, short witty speeches and an amusing cabaret combined to make a delightful evening for members of the Association of Light Alloy Refiners and Smelters and their guests at the annual dinner/dance held at the Empire Room of the Trocadero Restaurant, London, last Thursday. In the chair was Mr. W. W. Kee and after he had proposed the Loyal Toast, that of the Association was proposed by Dr. E. G. West, B.SC., F.I.M. (technical director, Aluminium Development Association). Mr. Kee responding. "Our Guests" was proposed by Mr. P. F. Millward and Mr. W. W. Abson (assistant secretary, Air A2, Ministry of Aviation) responded. Amongst official guests of the Association were also present representatives of the Board of Trade, Light Metal Founders' Association, Aluminium Development Association, Aluminium Industry Council, British Non-Ferrous Metals Research Association, National Association of Non-Ferrous Scrap Metal Merchants, and the technical Press. Dancing to Eddie Streven's Orchestra followed the cabaret turns, the party breaking up at midnight.

Carrick & Foster's Extensions

At the beginning of this month, Mrs. J. C. Chisholm, a director and wife of the managing director of Carrick & Foster, Limited, general ironfounders, Castlefields Foundry, Bingley, Yorks, opened the company's new two-storey block of offices. The premises comprise four offices and additional rooms on the ground floor, and two offices, a boardroom and other rooms on the first floor. A special feature is the open, connecting staircase of polished wood; the floors have been laid in Vynil tiling and there are ample windows, giving maximum light within and a pleasing appearance without. The Scandinavian-style brick and cedarwood offices were built in less than four months and the interior decorations were also completed in record time.

Carrick & Foster was formed in 1921 by Mr. Richard Carrick and members of the Foster (Black Dyke Mills) family, to produce textile-machinery, jobbing and engineering castings. The original, single-storey brick-built foundry now stands in the centre of the greatly-enlarged works. The company commenced by producing rainwater pipes, eaves and gutters for housing projects in the mid-twenties and this trade extended and developed to the production of heavy, cast-iron gutters for industrial premises to such an extent that it has become one of the leading manufacturers of this class of goods in Great Britain. The production of other castings of repetition lines has also been expanded over the years.

THE NEW £3,750,000 MARSHALLING RAILWAY YARDS at Newport, near Middlesbrough, went into operation on October 30. They constitute the largest and most expensive single modernization project in the North Eastern Region of British Railways, and are claimed to be the most up-to-date in Europe. Wagons can be directed into any one of the 42 sidings with the push of a button at the rate of one every four seconds. Much of the 250-acre site stands on reclaimed marshland. The yard replaces eight older yards. The "outward" section went into operation on October 30. The "inward" section, providing another 38 sidings, is expected to be ready by the end of next year.

BCIRA Annual Meeting

The need for further research work in the ironfounding industry is remarked on, particularly in view of Britain's probable entry into the Common Market. An improvement in the Association's industrial income is recorded but further effort is called for to enable it fully to benefit from Government grants. Other matters referred to include reorganization of the committee structure, progress of work on the laboratory block at Alvechurch, research work, technical services, and the election of officers for the coming year.

The 41st ordinary general meeting of the British Cast Iron Research Association was held in the Connaught Rooms, Great Queen Street, London, W.C.2, on November 8, Mr. Richard Miles, B.SC., M.I.MECH.E., the president, being in the chair. On the proposition of Mr. H. A. Redshaw, seconded by Mr. M. J. Glenny, the minutes of the 40th ordinary general meeting were approved and signed.

Report and Accounts

The president, presenting the annual report* and accounts for the year ended June 30, 1961, drew the attention of those present to the most interesting publication by the Department of Scientific and Industrial Research called "Combining for Research." This showed the number and names of the research associations assisted by DSIR, and the amount of assistance, together with the funds contributed by the members of the associations. Forty-nine such associations were listed, ranging from small ones connected with cutlery, files, springs, lime, felt, etc., to large ones whose work related to iron and steel production, coal, electrical and marine engineering, cotton and wool. The British Cast Iron Research Association was among the larger of the medium-size group, as befitted the importance of the industry. The support from DSIR was comparatively not ungenerous, again as befitted not only the Association's research activities, but also its practical service on the shop floor, which helped members to operate the latest techniques. He believed that this latter work was relatively greater than that of the average research association.

It was perhaps not necessary to emphasize the need for research in the United Kingdom. Even the smaller iron foundries, formerly having the reputation of being slow to change traditional methods, were taking more and more advantage of modern techniques. When one considered the amount of research undertaken in the USSR and the USA, together with the probable entry of the UK into the Common Market, competition would compel the use of the most advanced techniques in order to survive. Britain's entry into the Common Market was a development of a historic and inevitable trend. The time was arriving when, due to ease of communications and speed of transport, barriers such as customs duties should be removed from neighbouring countries in Western Europe and at some later stage throughout the whole world.

* Extracts from this Report were published in the JOURNAL issue of November 16.

Government Grant

Members would be aware that last year was the second in the current five-year DSIR grant period and they should know that the Council had, throughout the year, been concerned that the Association should obtain sufficient industrial income to obtain the full Government grant. Under the current grant terms, the Association could earn £74,000 in Government grant provided it could obtain £167,000 in industrial income. Actually, the grant-earning income received last year amounted to £160,263 and the amount of the Government grant was £68,900, compared with £65,375 for the first year of the quinquennium. The total income for the year was £255,473, that was, £9,747 greater than in the preceding year. That increase in income must be encouraging to members and staff alike; however, it was unfortunate that once again available Government grant had not been fully earned. If further industrial income of £6,737 had been received, the full Government grant of £74,000 could have been claimed. Unfortunately, grant not claimed in any one year was completely lost and could not be claimed in subsequent years. It was to be hoped the industry would endeavour to make it possible for the full Government grant to be earned for the current year.

Other Financial Considerations

Following careful financial control throughout the year, it was encouraging to note that the current assets stood at the high figure of £208,287, giving an excess of £193,676 over current liabilities. There were, however, further commitments for capital expenditure not included in the accounts, amounting to £42,408, and there was considerable uncertainty whether income for the remaining years of the quinquennium would be adequate to meet expenditure, even for the present scale of activities. It was hoped that members would agree that in these circumstances the Council had been wise to maintain the reserves at what, superficially, appeared to be a relatively high level, but which in effect amounted to little more than six months' normal running expenditure.

Last year attention had been drawn to the scheme whereby members wishing to obtain the full services of the Association were invited to enrol as ordinary (B) member iron-foundries, paying a subscription amounting to 0.1 per cent. of the annual foundry wages. Income from that source had shown an increase from £30,580 in 1959-60,

to £39,323 for the year under review. A complete list of ordinary (B) members had appeared in the Annual Report and the scheme could be commended to those companies whose names were not yet included in the list. The Association provided a comprehensive advisory service on all aspects of ironfounding, and all the facilities of its laboratories and workshops were used in support of that work. No other organization provided such a comprehensive service for such a modest subscription.

Finally, in connection with the accounts, they were greatly indebted to their friends in the Joint Iron Council for the contribution of £118,000 from the pig-iron levy fund. That formed the major part of the Association's grant-earning income, and continued to be the main source from which the planning of the finances of the Association originated.

Laboratory Extension

All who had visited the Association's headquarters at Alvechurch would be pleased to learn that during the last year the Council had found it possible to embark upon the building of the first stage of a new laboratory block. During the year, the president said, he had made a tour of inspection of the premises and he had noted the overcrowding which existed in much of the improvized accommodation. The new building would provide accommodation for a number of routine and research laboratories, and that in turn would enable a modest expansion of space allocated to the Member Service Department, the library and the administrative offices. The building was expected to be complete in January, 1962, and, with the modifications required to the older parts of the premises, a total expenditure of £70,000 was expected.

Other Matters

The Association had continued to maintain a comprehensive experimental programme, and members would, he was certain, approve the changes in committee organization by which Council exercised control of the Association's activities.

During the year full use had been made of the recently installed cupola, and the results so far obtained had aroused widespread interest. The work was on a full industrial scale and constituted one of the more costly investigations. During the year a new series of lecture courses was begun, at various centres throughout the country, with the objective of presenting the results of research in simple, practical, terms. The first of these, dealing with defects in grey-iron castings, had been most warmly received.

The Association not only provided an experimental programme and a confidential advisory service; it provided a comprehensive technical service on behalf of the entire industry. The staff of the Association represented the industry on a very wide range of committees, both national and international; contributed lectures and participated in conferences, and was engaged in active co-operation with many organizations in the interests of the industry which it served.

Finally he asked the meeting to express their appreciation of the work of the many members of Council, its committees and sub-committees. He said they had not forgotten an old friend, Dr. Pearce; his successor, their director, Mr. Morrogh, was more than maintaining the tradition and standing of the Association, ably assisted by the deputy director, Dr. Angus, and the secretary, Mr. Whiteside, and all their colleagues on their staff. (The president then proposed that the Report and the accounts for the year ending June 30, 1961, be adopted. Mr. S. H. Russell seconded the proposal and the resolution was carried unanimously.)

Re-election of President

Mr. H. J. V. Williams, chairman of Council, then asked that he might be permitted to claim his prerogative of proposing that Mr. Richard Miles be elected president for a second year. They all knew that Mr. Miles had taken an active interest in the Association and that this had involved him in much travelling during the year. All would be delighted to learn that the president had paid a visit to Alvechurch during the year, thoroughly to acquaint himself with the work on hand, and it gave him great pleasure to propose that Mr. Richard Miles be re-elected president of the Association in accordance with Article 23. Mr. M. M. Hallett seconded the proposition, which was carried unanimously.

A resolution that Dr. L. B. Pfeil, O.B.E., F.R.S., and Mr. G. S. Steven be re-elected vice-presidents of the Association, and that Mr. D. A. Richards, president of the Institute of British Foundrymen, be elected a member of Council and a vice-president was proposed by Mr. P. A. Russell, seconded by Mr. J. Bell and carried unanimously. The warmest thanks of the Association were accorded to Mr. G. R. Shotton, F.I.M., retiring vice-president in accordance with Article 23, on the motion of Mr. G. H. Johnson, seconded by Mr. H. G. Hall.

Mr. R. L. Handley, seconded by Mr. W. Brindley, first proposed that the re-election of members of Council retiring under Article 28 be dealt with by a single resolution, and then went on to propose the re-election of Mr. C. C. Booth, J.P., M.I.MECH.E., Mr. W. Brindley, Mr. A. E. Pearce, Sir Frederick Scopes, Mr. R. C. Shepherd, Mr. R. Taylor, Mr. H. J. V. Williams and Mr. L. F. Wright, all automatically retiring under Article 28; and that Mr. M. J. Glenny, Mr. C. M. G. Wallwork, Mr. George R. Webster and Mr. C. H. Wilson, members of Council appointed during the year in accordance with Article 30, be elected. The composite resolution, when put to the meeting, was carried unanimously.

H. Overton, Salt & Company, chartered accountants, were automatically re-appointed auditors to the Association in accordance with the Companies Act, 1948, Section 159(2). The warmest thanks of the meeting to the Council, committees and sub-

committees for their work during the year was accorded by a resolution proposed by Mr. B. McDougall, seconded by Mr. E. H. Page.

Rising to propose a resolution of thanks to the president for presiding at the meeting, Mr. N. P. Newman, C.B.E., J.P., said he thought they were all grateful to him for the way in which he had handled the meeting and they drew considerable satisfaction from the fact that he would be holding the same office for another year. The proposition was seconded by Sir Lincoln Evans, C.B.E., and carried unanimously.

Mr. H. Morrogh said that he wished to thank all members for their very kind reception of the president's remarks. The staff were particularly grateful not only for the financial support from members, but also particularly to members of Council, the president, and members of the various committees for their constant assistance and helpful advice on many matters of detail throughout the year. He wished personally to pay tribute to the staff of the Association. He tried to pursue a policy involving co-operation with all when it was clearly in the interests of the industry, and provide the fullest service and the most immediate response to all requests. This policy had placed a considerable strain on the staff, who had to travel widely at short notice. He was pleased to state that the staff responded to all requests eagerly. He felt it a great privilege to have the honour of leading them and he wished particularly to refer to the considerable assistance he received directly from the deputy director, Dr. H. T. Angus, and from the secretary, Mr. T. E. Whiteside. This concluded the meeting.

American Letter

Purdue's Conference

A look at the future and foreign developments were covered at the Purdue Metals Castings Conference, held on October 26 and 27 at Purdue University, Lafayette, Indiana. The Conference was sponsored by the School of Metallurgical Engineering and the division of adult education of Purdue University in co-operation with the AFS Michiana and Central Indiana Chapters. Two papers were presented in the morning session, the first on "Future of the Foundry Industry," by Mr. B. L. Simpson (of National Engineering Company, Chicago) and the second on "What is a Foundryman?" by Mr. Carl Schopp (of the Link-Belt Company, Indianapolis). Simultaneous non-ferrous, iron and steel sessions were held in the afternoon. Papers in the non-ferrous session included "An Optimum Method for Every Production System," and "Effect of Design on the Making of Non-ferrous Castings." In the iron session, papers presented were "Foundry Engineering in Europe," and "Perspectives in S.G. Iron," whilst "Core Economy" and "Economies in Arcair" were presented at the steel session. Technical sessions were continued on the following morning and the papers presented included "Quality Control and Marketing," "Dollars in Sand," and "Furfural Applications."

AFS Michigan Conference

New foundry developments were stressed at the AFS Michigan Regional Foundry Conference, held on October 19 and 20 at Michigan State University. The programme consisted of a panel discussion on future trends in casting tolerances, the speakers dealing with such subjects as metal composition, moulding techniques, coremaking, pattern equipment, and machine-shop requirements. "Management *versus* Compensation Problems" was discussed at a luncheon meeting by Mr. F. A. Warner (of Auto Owners, Inc.), and other papers given on the first day of the Conference were "Hot- and Cold-box Coremaking using Chemical-setting Corebinders," "Hydraulic Approach to Gating," and "Mould Control in Medium-size Foundries." Further technical sessions were held on the Friday when the papers included "New Market Opportunities for Metal Castings," "A New Look at Plastic Patterns for High Production," "Challenge of the Foundry Industry to the College Student," and group discussions on various metals and operations. A tour of the Oldsmobile plant at Lansing was the concluding event.

Trends in the Valve Industry

The chairman of the British Valve Manufacturers' Association, Mr. F. Burgess (managing director, Whites-Nunan, Limited), referred in his report to the 22nd annual general meeting of the British Valve Manufacturers Association to trends in the valve industry. He stated that it appeared likely that in 1961 the UK valve industry would produce a greater value of valves than in any earlier year, surpassing the 1960 figure of £38,200,000, which itself was a record. The value of output was up by more than 10 per cent. in the first half year of 1961 compared with the same period last year. Valve exports were also greater.

A recent BVMA enquiry to members as to economic trends in the valve industry indicated that at October, 1961, compared with six months earlier:—(*a*) The rate of total new orders was, in general, higher. (Half the replies reported it to be higher with only one-tenth reporting it lower); (*b*) the value of uncompleted orders was approximately the same for non-ferrous valves and only slightly higher for ferrous valves, and (*c*) monthly level of output was, in general, higher, but was limited in some cases by a shortage of skilled labour. In a number of instances output had also been affected by a shortage of stainless-steel components, such as castings, and bar material.

The same survey showed that the majority view was that general business activity in the valve industry during the next six months would remain about the same as at present. Mr. Burgess in assessing the situation in the valve industry as being not unsatisfactory, warned that in general profit margins had fallen rather than risen.

At the election of officers which took place immediately after the annual general meeting, Mr. A. Robertson (managing director, Glenfield & Kennedy Limited) was elected chairman of the Association for the year 1961/62, and Mr. F. Burgess, vice-chairman.

Others elected to the executive committee were:—Mr. D. Bailey (Sir W. H. Bailey & Company, Limited); Mr. B. S. Bass (Dewrance & Company, Limited); Mr. D. S. Birkett (Samuel Birkett, Limited); Mr. W. R. Blakeborough (J. Blakeborough & Sons, Limited); Mr. F. S. Ham (Ham, Baker & Company, Limited); Mr. H. R. Hammond (Crane, Limited); Mr. K. M. Leach (Audco, Limited); Mr. N. P. Newman (Newman, Hender & Company, Limited); Mr. T. B. Pattison (Alley & MacLellan, Limited); Mr. A. L. Trump (Saunders Valve Company, Limited), and Mr. R. F. Walker (Walker, Crosweller & Company, Limited).

Management and Automation

Speaking at the National Conference of the British Institute of Management on "Management and Automation," held at Torquay on October 25, Mr. L. Landon Goodman, B.SC., A.M.I.MECH.E., industrial specialist, Electrical Development Association, said: "Automation starts with marketing and sales, for large-scale production requires large markets. The salesman should not be a lone operator at the end of operations, for automation demands an integrated approach and a team effort on the broadest possible scale; the salesman must be inside the team instead of on the fringe. This does not demand so much a new kind of salesman as a revival of the old quality, for salesmanship becomes something of a lost art in days of easy selling. Unless the tempo of sales equals that of production, disaster can come more quickly than in a non-automated industry. The salesman will have to enter more intimately into design, marketing, merchandizing, advertising and packaging, and all of these activities will need to be geared more precisely to the automated system. In some companies, this state of affairs already exists, but it is by no means universal."

Continuing his address, Mr. Landon Goodman said the full technical implications of automation were unfolding and automation was already spelling variety. This feature, he said, had been apparent to some extent even with high degrees of mechanization, and he cited the Lorain production line of the Ford Motor Company as an example, saying that this plant produced 20 different models in single colours and nine in two-tone combinations. It provided 15 different engine and transmission combinations; there were two types of heaters and radios, power seats, power windows and a multitude of other optional features, thus giving a total of 776,355,840 different combinations of the Ford car. Production he said was at the rate of 147,760 cars per year, so at that rate, it would take 5,185 years to hit every combination—even on the basis of one only of each type!

Fortuitous Approach

The speaker added that too often companies did little to extend the use of their products and seemed to rely entirely on a fortuitous approach from an imaginative and hopeful enquirer, and it was surprising that large sums of money could be spent in developing a product and comparatively little in developing its utilization to the full. He said a feature of future competition would be the struggle amongst the leading industrial countries to become primary centres of production. In the US, production of certain goods and products had tended to concentrate in certain areas, and the future scale of automatic production in Europe would lead to similar concentrations. The most-highly-automated countries would surely get the business, he said, and in the meantime, manufacturers in particular industries could do much by exchanging information and co-ordinating expansion plans as is done at present in the steel industry.

Consultative Bodies

The idea of a local advisory panel was one which might well be developed and in each industrial area firms could be encouraged to join together to form local research and development group centres, staffed by scientists and engineers. The firms would provide a management panel which would allocate projects and consulting work from the various members according to priorities. Too many research reports, he said, were lying unused on too many shelves, and these local centres could also act as useful clearing houses for this type of information.

Finally, Mr. Landon Goodman said that a development of automation could do much to stimulate attention to these and many other matters, to sponsor research, to publish information, and possibly most important of all, to "tie together many of the loose ends." In order to flourish, it seemed essential that this proposed department should have the active support of trade unions and management as well as that of the Government.

Sunderland Shipbuilding

Mr. Arne Skaug, Norwegian Minister of Commerce and Shipping, announced at a dinner at Sunderland last month that an order for an 80,000-ton tanker has been placed with Joseph L. Thompson & Sons, Limited, Sunderland, by the Olsen Line of Norway. Including the diesel engines—which will be provided by Harland & Wolff, Limited, Belfast—the contract is worth between £4 and £5 million. The tanker will be the largest vessel of its type yet built in this country.

Mr. R. C. Thompson, chairman and joint managing director of Thompson's shipyards, who was at the dinner, told the Press that as the yards were running out of work, the contract was not only a great triumph but also meant full employment until 1964. "For after we finish this one, we will build another 50,000-ton tanker."

The dinner, at which the principal guest was King Olav V of Norway, was given by Sunderland Corporation to mark the opening of the North-East Coast's Norway Week. The 300 guests included Sir Keith Joseph, the newly appointed Minister of State, Board of Trade, the lord mayors and mayors of the principal Norwegian and North-East Coast towns and cities, and leading industrialists and trade unionists.

It was announced at the first annual meeting of the recently formed Doxford and Sunderland Shipbuilding Company, of which Thompson's is the biggest yard, that one of the yard's berths is to be extended so that tankers of up to 100,000 tons can be built. A 50,000-ton tanker which will be ready for launching early in the New Year, will be the biggest ship so far laid down on this berth, and the largest constructed on the River Wear. The Olsen tanker due to be handed over in September, 1963, will then be laid down.

British Trade Display in India

The wide variety of products exhibited by British firms at the Indian Industries Fair, which opened in New Delhi on November 14, emphasises the theme of the official display "Britain: India's Industrial Partner." The Board of Trade has a site at the Fair of 66,000 sq. ft., of which the British Pavilion covers about 40,000 sq. ft. The two major sections in the Pavilion are the BOT exhibit, which outlines Britain's continuing contribution to the industrialization of India, and the commercial section in which British firms, and Indian firms with British connections, are staging their products on stands provided by the BOT. This section covers about 26,000 sq. ft. and accommodates 48 firms. There are also two exhibitors in the outside section of the official British site and 10 others with British connections are exhibiting independently in their own pavilions. The Fair, organized by the Federation of Indian Chambers of Commerce and Industry, is due to end on January 1, 1962.

Sheffield Foundry Exhibition

The Lord Mayor of Sheffield, Alderman J. W. Sterland, opened the 1961 Sheffield Foundry Exhibition, held at the Somme Barracks, from November 7 to 10, and in his remarks, praised the enterprise of the Sheffield Foundry Trade Technical Society and the Sheffield branch of the Institute of British Foundrymen who had jointly arranged the exhibition. He said it was just what was needed to strengthen Britain's position relative to the Common Market. Mr. A. Hardy, president of the Sheffield Foundry Trade Technical Society, said he had visited foundries in many parts of the world—including China and the Far East—and had come to the conclusion that Britain was leading in safety techniques. Thanking the Lord Mayor for his interest, Dr. R. V. Riley, president of the Sheffield branch of the IBF, presented Alderman Sterland with a pair of scissors, saying that he felt sure that he would find much to interest him in the exhibition. Following the official opening, the Lord Mayor spent 1½ hours in touring the stands.

" On-the-spot " Impressions

Details of all the stands at the Exhibition were printed in the JOURNAL issue of November 2, and the writer, during his tour of the exhibits, was able to confirm the very considerable interest of the displays. No great novelty of stand arrangement was aimed at, it was just a practical down-to-earth show put on by founders and foundry suppliers demonstrating to fellow foundrymen and laymen just what was currently being developed in the industry and the very wide sphere covered by foundry activities. It must be remembered that only the relatively short period of 18 months has elapsed since the Foundry Exhibition at Bingley Hall, Birmingham, and thus the exhibits on view in Sheffield concentrated on detailed improvement and the presentation of companies' ranges of products by pictures, models, film shows, rather than on new items.

It was estimated that up to the end of Thursday, over 3,000 visitors had been admitted during the three days the Exhibition had been opened, and all the exhibitors were confident that this rate would be maintained, if not exceeded, on the final day. It was gratifying to see the large attendance of young tradesmen and a number of organized visits of young people had also been arranged; surely this augers well for the future of the industry.

Chatting with stand holders revealed that all were satisfied and even surprised at the extent and nature of the attendance and some firms proudly exhibited visitors' books displaying well-known names in the foundry industry, coming from places as far apart as South Wales and Scotland. The pattern of attendance seemed to be at director or senior-executive level during the afternoon, a comparative lull at teatime, followed by an influx of workpeople and not a few draughtsmen, designers, and foremen—*i.e.* those unable to obtain day-leave from their employment—in the remaining period up to closing time at 9 p.m.

General Comment

Limitations of the exhibition hall were referred to by many people, most saying it was much too small, but all were pleased with the help they had received from the organizers and the way in which the publicity had brought such good attendance. Some exhibitors referred particularly to the assistance they had received from the military in setting up their stands at the Somme Barracks. One in particular recounted how the manhandling of a large core on to one of the stands had engaged the combined efforts of a sergeant-major, 14 privates, four directors of his firm and two lorry-drivers—all working with military precision!

Despite the earlier announcement that the structure of the building would not permit the operation on the site of large-size machines, there were in fact quite a number of shell coremakers, examples of pneumatic equipment, electrically-operated small tools, etc., being demonstrated in use, even though the stand of one of the moulding-machine makers had to be housed in an annexe to the main exhibition, known as the Cinema Hall. Only one foundry had taken space at the exhibition and this had on display a number of small steel castings from the lighter end of their very wide production range, plus pictures of heavier items. The view was expressed by representatives of this company that they wished they had brought along more castings for display, as great interest was shown in those they had with them.

No-one should under-estimate the value to the industry of these small local exhibitions—they combine the opportunity of a shop-window in the heart of the country's foundry centres with the chance for really down-to-earth discussions between local foundrymen and their suppliers of plant and equipment. Orders secured at such exhibitions take second place to the really worthwhile liaison discussions which ensue, although it was reported that quite a number of exhibitors were surprised at the firm business which was conducted.

The writer records his congratulations to the Sheffield Foundry Trade Technical Society, and in particular to its secretary, Mr. W. H. Bolton, and to the IBF Sheffield branch for the excellence of the Exhibition. By this active interest and discussion between the men who make the machines and materials for the industry and the men who use them, the foundryman's job can be given added interest. He can feel that by his comments as a user he is contributing to the development of the industry's tools.

G.E.C. (Engineering), Limited

A new company, G.E.C. (Engineering), Limited, has been formed to take over and develop the engineering activities of the General Electric Company, Limited. This is in accordance with the new policy of the GEC to form its manufacturing groups into subsidiary companies. The manufacturing resources of the new company comprise the electrical engineering works (and foundry) at Witton, Birmingham, and the mechanical engineering works at Erith, Kent. The total number of employees exceeds 15,000.

Directors of the new company will operate from headquarters in London, and negotiations for the acquisition of suitable premises are at present in progress.

The following appointments have been made to the board:—As chairman and managing director, Mr. R. N. Millar; director and general manager (Witton works), Mr. T. H. Kelsey; director and general manager (Erith works), Dr. K. J. Wootton; commercial director, Mr. C. J. O. Garrard; financial director, Mr. E. Nicholson; development director, Dr. H. K. Cameron; production director, Mr. G. M. F. Donnelly; personnel director and assistant general manager (Witton works), Mr. W. D. Morton, and secretary, Mr. J. E. Thomas.

The two members of the board new to the GEC organization are Mr. Donnelly (from British Northrop, Limited), and Mr. Nicholson formerly with the UK Atomic Energy Authority. Further appointments include Mr. D. W. T. Angwin, who becomes assistant general manager, Erith works; and Mr. J. C. Morris, who becomes commercial manager, export projects, both appointments effective from January next.

European Mechanical Handling Federation

Section II (continuous handling equipment for bulk products and unit loads) of the *Fédération Européenne de la Manutention* (European Mechanical Handling Federation) held meetings in Paris in mid-October at which ten countries were represented—Austria, Belgium, Denmark, France, Germany, Great Britain, Netherlands, Spain, Sweden, Switzerland. Amongst items discussed by the working groups of the section were: Standardization of belt conveyors for bulk products; safety regulations; terminology, classification and symbolization of conveyed bulk products, and a standardized questionnaire to be completed by customers.

The general meeting of the section was presided over by Mr. Gert Salzer (Germany) and this was followed by the presentation of the new British film produced by the Mechanical Handling Engineers' Association entitled "Mechanical Handling At Your Service." The next meeting of the section will be held at Frankfurt/Main at the beginning of April, 1962.

At the meeting of Section IV (industrial trucks), also in Paris in mid-October, some 50 representatives from 10 countries were present together with an observer from the Industrial Truck Association of America. Representatives of prominent truck manufacturers from Western Europe included a strong contingent from Great Britain and, during the course of the debates, further progress was made on the various projects for the rationalization and standardization of industrial trucks and components.

One of the most important matters on the agenda was that of standardization of tyres and a representative of the British tyre makers was present as an observer. Since the 16th meeting of the section, when nine sizes of pneumatic tyres had been adopted, a sub-committee has been working on solid-tyre standardization, and a report of their investigations was submitted to the meeting. This embraced a selection of 26 sizes of solid tyres suitable for standardization with maximum loadings for drive tyres at different speeds, and with reduced loadings for steer tyres. A considerable measure of agreement was reached.

Two further sections of the regulations for standardization of power-truck controls, which had been drafted by the German delegation, and which dealt with pedestrian-controlled trucks, were adopted in principle. The draft proposals by the British delegation, intended as the basis for a European safety code, were reviewed in some detail.

As a result of the work of a sub-committee, much progress was reported on a completely revised and expanded edition of the Terminology for Industrial Trucks, which will be in six languages. At the end of the meeting, Mr. Dreyer, having come to the end of his term of office, relinquished the presidency in favour of Mr. Hooghiemstra (Holland), with Mr. Assentoft (Denmark) as first vice-president and Mr. Carasa (Spain) as second vice-president. The next meeting of the section will be held in London in May, 1962, at the conclusion of the Mechanical Handling Exhibition.

Mr. PETER CHAPMAN, 22-year-old draughtsman at the English Steel Corporation, Limited, has been chosen from 17 applicants to represent Sheffield at the World Rover Scout Moot in Australia in December. The official opening of the Moot takes place on December 27, and Mr. Chapman leaves with the British delegation on December 21.

Evolution of Production Costs . . . A World Survey

Costs of production are often lower in the United States than in the other great industrial countries of the world, although a contrary opinion is extant in the lesser-developed countries. This statement results from an enquiry undertaken by a special commission of the National Industrial Conference of the US and reported in the French journal *l'Usine*.

The inquiry is based on the examination of 249 studies of cost prices carried out in 1960 and early 1961 by 147 American industrial firms operating both in the US and abroad. The Commission reports that in two cases out of three, the raw materials are more expensive overseas than in the US and, moreover, often notably so, yet with the least differences in Canada and Great Britain. Raw materials on the average account for 37 per cent of the total cost price in America as against 46 per cent in the general run of foreign countries. The difference in wages, which are lower abroad, rarely shows itself in the same proportion in the cost price because the rate of productivity is nearly always lower than that of the United States. Despite that, the cost of a unit of labour abroad is two-thirds lower for comparable operations in the US in half the cases reported to the Commission.

Cost of Manufacture

The cost of manufacture in Great Britain and in the countries of the Common Market are generally lower than those established for the United States. The German cost prices are often less than those of the other members of the European Economic Community; those of Canada are in general higher than those of the US, though they may often be quite small. The costs of manufacture in Latin American countries and in Australia are distinctly higher. This is particularly true of the former because of the high cost of raw materials and the incidence of overheads, which scarcely compensate for the lower labour and distribution costs. So far as Canada is concerned, there is no difference in the cost of raw materials as compared with the US.

Philadelphia Engineering Show

To assist British firms who wish to sell or find representation in the United States market, the British Consulate General at Philadelphia will be manning an official information stand on behalf of the Board of Trade at the National Plant Engineering and Maintenance Show, to be held at Convention Hall, Philadelphia, from January 22 to 25, 1962. Manufacturers are invited to send direct to the Consulate General, at 12 South 12th Street, Philadelphia 7, Pa., USA, 50 to 100 sets of trade literature, including catalogues and export price lists (preferably c.i.f. eastern seaboard in US dollars) specifying whether they are seeking representation at the Show, or merely wish to have enquiries referred to them; correspondence reaching the Consulate not later than December 1. The Export Publicity and Fairs Branch of the Board of Trade, Horse Guards Avenue, Whitehall, London, S.W.1, will be pleased to give firms guidance on the despatch of sales literature, and further information about the Show may be obtained from the British Consulate General.

Mr. L. G. LEWZEY has been appointed secretary of the A.E.I. Lamp & Lighting Company, Limited.

Notes from the Branches

Lancashire

Mr. H. Tattersall's paper on "Operations in a Die-casting Factory" attracted an exceptionally large attendance of members to the November meeting of the Lancashire branch of the Institute of British Foundrymen, held at the Midland Hotel, Manchester, under the chairmanship of Mr. F. Lord, branch president.

Mr. Tattersall commenced his lecture by defining die-castings as those produced from metal moulds, and went on to outline the difference between gravity- and pressure-die-casting methods, detailing temperature control of the die moulds and venting methods. He also dealt with the application of the "Centralograph" system of dialing faults on to a recorder—to obtain the best results from a battery of die-casting machines—and the spark-erosion process of producing dies. He stated that there were about 23 different aluminium alloys in common use in the die-casting industry. Following a vote of thanks proposed by Mr. A. S. Beech, the meeting was declared open for discussion.

Discussion

To the first questioner who wanted to know if Mr. Tattersall had any knowledge of the Shaw process of making dies, and also where the demarcation lay between gravity- and pressure-die-casting, the lecturer said he was at present conducting experiments with the Shaw process, but thought it might possibly be restricted to producing gravity-dies. The quantity required determined the line of demarcation, *e.g.*, "gravity" for small runs and "pressure" for large quantities. Replying to other enquiries, Mr. Tattersall said that choice of method of melting for aluminium was a question of economics. Coke melting was the cheapest but was avoided because of handling difficulties; next in order of cost were oil, gas and electricity; gas was the most commonly used but electric melting enabled temperatures to be maintained very economically. To other queries he replied that locking pressures were going up and this permitted a reduction of gate size, and die venting could be effected through the ejector pins. He pointed out that no two dies were alike, which fact necessitated individual gating methods—in his own foundry gating designs were supplied by experts; the die steels used, he said, were of the chrome/molybdenum type.

Spark-erosion Process

Dealing with a question about the wear of electrodes used in the spark-erosion process, and the accuracy of dies, he said that electrode accuracy depended on the rate of metal removal and that from five to 30 electrodes might be required for a job, electrodes, however, need not be in one piece as they could be built up. He thought the decorative type of dies were best made by this process. The time factor, he said, depended largely upon the operator who made the electrodes. He could only guess at the time needed to make such components; for the example illustrated that evening they had cost £70, a sum which represented about 100 man/hours. Interruptions in castings production from dies were most commonly caused by the failure of ejector pins and small cores might also cause trouble. Two most important factors were temperature control and die lubrication. In calculating die temperature, the thickness of metal as well as the surface area of the die should be taken into account. Mr. Tattersall added that there appeared to be no limit to the size of work which could be done by the spark-erosion machines and he believed that the Citreon Company used the process for die making. His own dies were made in Paris. Different types of steel were used for the production of dies for casting zinc and aluminium alloys.

Answering questions about the Centralograph system, he said this was not a form of control but was an "indicator," in other words it did not improve castings but told the operator whether or not the machines were operating correctly. Contact pyrometers were used to record temperatures at various parts of the die.

At the conclusion of the discussion the chairman thanked the lecturer for a most interesting paper, and announced that the secreary, Mr. Buckley, would try to obtain a film on die-making for showing, possibly, on the same evening as the next annual general meeting.

Australia (Victoria)

The October meeting of the Australia (Victoria) branch, held at the Royal Melbourne Institute of Technology, was addressed by Mr. H. Petter-Flaathe, of ASEA, Limited, Sweden. His subject was a "Review of Electric Melting Units, with Special Reference to Foundry Practice in Sweden." Following discussion of the paper, the meeting concluded as usual with a light supper.

Foundry Atmospheres Committee

Following a suggestion from the round table conference on clean air, the branch has formed a sub-committee to investigate foundry atmospheres and emissions. It will be concerned with (*a*) the collection and collation of factual information relating to the health nuisance and technical principles of the problems associated with environments, both inside and outside the foundry; (*b*) to provide this information to members of the Institute, and (*c*) to examine and state efficiencies and relevant costs of different types of equipment, but not to differentiate between manufacturers.

Second Commonwealth Study Conference

A total of 260 representatives from 35 Commonwealth countries will meet in Montreal, Canada, from May 13 to June 6 for the Duke of Edinburgh's Second Commonwealth Study Conference. The names of the British team (which numbers 40) were announced on November 15 by Lord Fleck, chairman of a committee of industrialists and trade-union leaders who had chosen the team from no fewer than 122 nominations. Representing the foundry and kindred industries in the British team will be Mr. R. F. Marshall (Associated Electrical Industries, Limited), Mr. G. A. Montgomerie (of Serck Radiators, Limited), Mr. D. A. Ogilvie (of Baker Perkins, Limited), Mr. F. A. Ruhemann (of Tube Investments, Limited), Mr. G. England (Central Electricity Generating Board) and Mr. D. Beattie (British Transport Commission). The first conference, held at Oxford in 1956, was attended by 277 members representing 30 countries.

YACIMIENTOS PETROLIFEROS FISCALES, of Argentina, has called tenders Nos. 1291, 1292 and 1293 for the materials, machinery and equipment needed to build three 19,660-ton tankers at the shipyards of El Ferrol del Caudillo, in Spain. The closing date is December 12 and documents are obtainable for 4,150 pesos from YPF at Avenida Roque Sáenz Peña 777, Buenos Aires, or for US $50 from Room 2756, Time Life Building, 50th Street and 6th Avenue, New York City.

Engineering Materials and Design Exhibition . . .

. . . Foundry Exhibitors Predominant at Earls Court, November 13 to 18!

For the second time, the Engineering Materials and Design Exhibition was predominantly an exhibition of castings. Displays of the foundryman's art in a profusion of metals and alloys of all varieties stole the show. In addition to the stands and exhibits described in the November 9 issue of the JOURNAL numerous other founders had their products on view to a commercially interested, knowledgeable and appreciative public. The overall approach of exhibitors was to stress the competitiveness of the cast component, its accuracy, finish and dependability in every conceivable type of service condition. An abundance of literature specifying the physical properties and range of application of all materials backed up the visible qualities of the components on view. On each of the stands visited by the writer there were in attendance not only sales representatives, but senior foundry technicians able to discuss on the spot with possible customers the way in which castings could be economically used to solve their production problems. The standard of display was throughout lively and imaginative and the settings and accommodation of the stands designed in the most attractive manner.

Among firms participating were the following, with a particular reference to those sections of their displays that illustrate aspects of the foundry industry not covered in the preview of the exhibition already given in the JOURNAL:—

Lloyds (Burton), Limited, are producers of a wide range of high-duty and s.-g. irons, manganese steel, and alloy steels up to 20 tons in weight. Representative of their output of alloyed iron they featured precision-cast tyre moulds, several types of link-belt and chain conveyor for heat-treatment furnaces and centrifugally-cast tubes.

John Harper & Company, Limited, showed applications of grey-iron, meehanite and s.-g. iron to a number of varied designs of casting. Components in materials to meet wear resistance, pressure tightness, and impact resistance service conditions were displayed together with a vitreous-enamelled weighing-machine casing. Tools cast-to-form for working metals and plastics were on display.

Ashwell & Nesbit Limited's, stand utilized its space to the full with grey-iron in various grades of BS 1452 in heavier-type components for the machine-tool industry. Among their examples to the exacting quality requirements of machine-tool manufacturers, were a 48-in. boring-mill body, bases for precision-measuring instruments, a skin-milling machine bed, a marine diesel-gearbox case, a lathe body, and a marking-off table.

O'Neill & Company (Castings), Limited, representing a wide spectrum of casting processes in the number of foundries they represent, carried samples of the output of the following producers: Wilsons Foundry & Engineering Company, Limited, Lancaster & Tonge,

Attractively set-out display of Association of Bronze & Brass Founders. Individual exhibits and the general theme of this stand were described in the November 9 issue of the JOURNAL.

View of the Magnesium Industry Council's stand showing part of the display section and the glass-partitioned demonstration of magnesium turning.

Limited, Spunalloys, Limited, Carlton Die Castings, Limited, and Brecknell, Dolman & Rogers, Limited. Of the last two companies, Carlton Die Castings, Limited, displayed an interesting die-casting component for the coal-mining industry which for safety reasons has to be made of zinc for underground use but may be produced more cheaply in aluminium for the surface. The same die is utilized for both materials. Brecknell, Dolman & Rogers, Limited, cast in a wide variety of copper-base and aluminium alloys, and include dairy-metal components among their more-intricate products. Other firms represented by the O'Neill organization, on the stand, offered alternative metal forming and fabrication services.

The Magnesium Industry Council featured a practical demonstration of the ease with which magnesium parts may be machined, and the turning operation in progress on their stand attracted a great deal of attention. Illustrations of the response of magnesium to a variety of forming processes included sections on sand-, gravity- and pressure-die-casting. (See photograph above of MIC stand.)

During the tour which followed his opening of the Engineering Materials and Design Exhibition on November 13, Sir William G. Penney, K.B.E., deputy chairman of the United Kingdom Atomic Energy Authority, is shown (third from left) with his entourage at the stand of Lake & Elliot, Limited, iron and steel founders of Braintree. In close proximity were other stands of foundry firms —the nameboard of one of them being visible in the background of the photograph.

P.I. Castings (Altrincham), Limited, exhibited on their stand, an imaginative combination illustrating the nature of the investment process and the incorporation of lost-wax castings in unusual service conditions. A spray of wax patterns, a cut-away poured plaster-mould and the fettled casting, demonstrated, step-by-step, the stages of production. Complementary to this the modelled bust of a high-altitude flyer showed investment castings as operating finished components. The exploitation of interest in "live" foundry processes might have greater possibilities in stimulating appreciation of finished products.

* * * *

The exhibition, held at Earls Court, London, was open to the public from November 13 to 18. Approximately 19,000 people visited the stands of the 91 exhibitors, and there were 1,200 delegates to the conference on engineering materials and design that ran concurrently with the exhibition. Above all this was a foundry exhibitor's event and there can be no doubt that the care and hard work expended by the industry was rewarded with the great interest shown by visitors in the numerous and varied examples of the cast product on view.

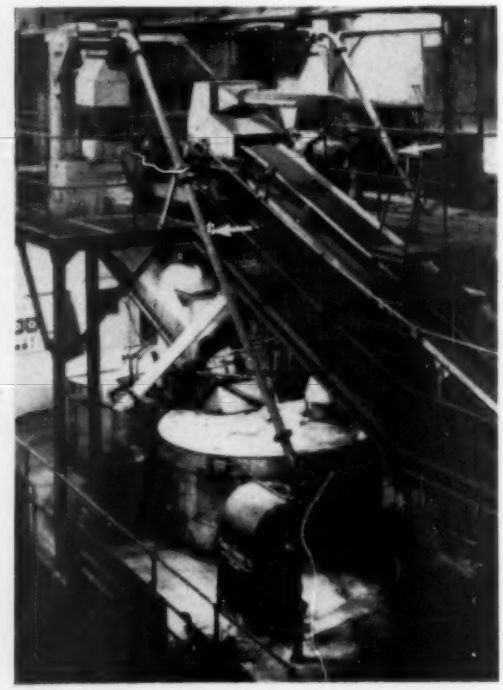
A FULLY-WORKING MODEL of a section of the rolling-mill plant which Davy & United Engineering Company, Limited, of Darnall, Sheffield, have built for the new Durgapur Steelworks in India, has been flown to India by a special air freighter flight. The model is being shown at the Indian Industries Fair which opened last Thursday. The model, 32-ft. long, 5-ft. wide and 6 ft. 3 in. high, shows the primary and intermediate blooming mills and continuous billet mills with all ancillary equipment. It has been constructed by Clarkson & Son, Limited, model engineers, of York, and is claimed by the firm to be the biggest work of its kind ever made.

Equipment and Supplies

Tubular Conveyors

Seven Fisholow-Hapman *en masse* tubular conveyors (Fig. 1) have been installed by the materials handling division of Fisher & Ludlow, Limited, Tipton, Staffs, in two important plants controlled by English Steel Corporation, Limited, at Sheffield. Five of the conveyors are in use at the new factory at Tinsley Park, recently built at a cost of £500,000 by the Corporation, and two others are at work in the foundry of English Steel Castings Corporation, Limited. In the older Grimesthope Works, two more Fisholow-Hapman conveyors have been installed in the steel foundry for elevation of the moulding sand. Here, the ingredients arrive in bags from which they are discharged into a hopper with a V-shaped bottom. Open sections of conveyor tube run in this channel, picking up the materials and elevating them to an overhead storage hopper, into which they are discharged with the aid of a vibrator unit. The materials are then fed with sand in weighed quantities by gravity through chutes into one of two mills used for mixing sand. There is an overflow discharge port which, when the overhead storage hopper is full, returns surplus material to the lower hoppers. The conveyors, which form part of an installation carried out by Foundry Equipment, Limited, have 3-in. dia. tubes through which neoprene flights are drawn on the chain moving at 20 ft. per min. They are stated to be capable of moving about 1 cwt. of bentonite and half-a-hundredweight of cereal every four minutes. The conveyors are driven by standard 1-h.p. motors and ¼-h.p. motors for the vibrators.

FIG. 1.—*Fisholow-Hapman tubular conveyors (arrowed) taking dextrine and other binders to the sandslinger plant at English Steel Castings Corporation, Limited.*



Electron-beam Machining

The Carl Zeiss Foundation of Oberkochen, Western Germany, announce new developments in the cutting, die-sinking and drilling of a variety of materials including hard metals and jewels by means of electron beams and machines now available for these purposes. The electron beam is used to fuse material or to remove its surface by vaporization. According to the manner in which it is used the effect is one of welding, milling, cutting or drilling. Since these processes take place in vacuo, zirconium, tungsten and other materials which hitherto were difficult or even impossible to work can now quite easily be treated. In the fields of milling and drilling and die-sinking virtually any arbitrary profile can be cut, including slits, shutters and diaphragms. Machines are now available with vacuum chambers of up to 20 metres in length in which materials of up to 8 metres long can be treated. British agents for the Carl Zeiss Foundation are Degenhardt & Company, Limited, 6, Cavendish Square, London, W.1.

Dust-collection Equipment Exhibition: Prat-Daniels (Stroud), Limited, staged an exhibition of their equipment at the Birmingham Engineering Centre last month. Amongst items shown, several were of interest to foundrymen, including a wet spark-arrestor for foundry cupolas which comprised a model installation for two 3-ton per hr. cupolas, associated piping, pumps, settling tank, etc. Tubular dust-collectors and fan stacks were also exhibited. The former operates on the method of separation of dust by centrifugal action, and for this the firm's unit consists of a number of high-efficiency small diameter cyclones grouped in a common casing. The fan stack is a compact unit combination of fan, inlet box and stack, each inlet box being an integral extension of the stack base to produce a self-supporting structure.

The firm's Wetclone dust-collector is claimed to be especially suitable for indivdual machine operation and, as it embodies a wet method of collection, abrasive materials and inflammable dust can be dealt with. The inlet branch on entering the body of the washer is immersed in a water bath so that the dust-laden air and water are sucked up by the vortex formed by the cyclone. The water is vaporized and washing action obtained through water droplets at high turbulence. Other items exhibited included centrifugal fans; a low-resistance dust-collector; a turbo-collector with a combined induced draught fan and grit arrestor; and smoke detection equipment. In addition, the firm's special services include industrial ventilation, gas washing, pneumatic conveying and drying. Increasing attention to the emission of fumes has resulted in the development of a fume incinerator process, a model of which was displayed at the Birmingham exhibition.

Bending Machine: Applicable also to the bending of core wires, gaggers and lifters, Chamberlain Industries, Limited, Staffa Works, Argall Avenue, Leyton, E.10, announce a new version of their recently introduced B.2 type bender. Designated the B.3, this latest hand-operated hydraulic machine is especially designed for bending electrical conduit and similar materials up to 1½ in. o.d. Power is provided by a single-stage hydraulic pump-ram unit, operating on oil and developing a maximum thrust of 8 tons at 5,000 lb. per sq. in.

News in Brief

WILSON'S FOUNDRY, LIMITED, are to build additions to their machine shop at Bishop Auckland.

AN AGREEMENT has been reached for the manufacture of 220-400 h.p. diesel engines in Argentina, under licence from the National Gas & Oil Engine Company, Limited, of Britain.

THE BRANCH OFFICE in Canterbury of United Dominions Trust, Limited, will move to new premises in 8, Rose Lane, on November 27. The telephone number will remain the same—Canterbury 5067/8.

A COMPLETE MINERAL-TREATMENT PLANT, installed at the Avonmouth works of the National Smelting Company, Limited, has been acquired for resale by George Cohen Sons & Company, Limited, one of the 600 group of companies.

THOMAS SMITH & SON (RODLEY), LIMITED, have recently despatched to Burma the second of two truck cranes ordered by the (Burmese) Ministry of Defence and placed through the company's agents, U. Aye & Company, of Rangoon.

A 350-TON BLANKING PRESS has recently been shipped by the Scottish Machine Tool Corporation to Japan to the order of Hitachi, Limited, Hitachi City. The press is complete with decoiling, levelling, feeding, and scrap-cutting equipment.

THE CANADIAN STEEL COMPANY, Atlas Steels, Limited, will be establishing a plant in Melbourne next year, at a cost of £A500,000, for production of a complete range of high-speed steels, including drawn steels and drawn stainless-steel wire.

W. J. JENKINS & COMPANY, LIMITED, Beehive Works, Retford, Notts, have received an order worth more than £170,000 from the Guest, Keen Iron & Steel Company, Limited, for a coke-handling and screening plant for their East Moors works at Cardiff.

THE SELF-CONTAINED Cooktown-Laura railway system in Queensland is for sale, complete with track, buildings, bridges, three wagons and a diesel rail motor. In recent years this 67-mile line has been losing money and will be closed down at the end of next month.

FOUR FORK-LIFT PALLET TRUCKS to be despatched by the British Materials Handling Division of the Yale & Towne Manufacturing Company to Holland, in the first week of December, brings the total number of trucks exported to the Netherlands by the Division to over 150.

AN ORDER worth £400,000 for eight 11,000 v. motors to drive the standby boiler-feed pumps at Ferrybridge "C" power-station, has been placed by G. & J. Weir, Limited, Glasgow, and will be carried out by the heavy plant division of Associated Electrical Industries, Limited, at Trafford Park, Manchester.

THE BOARD OF TRADE announce that they are offering for sale by tender about 880 tons of zinc for delivery and pricing between December, 1961, and April, 1962. All the zinc is high grade or special grade. Tender forms are available from E.I.D. (4), Board of Trade, Lacon House, Theobalds Road, London, W.C.2.

THE NEW SAFETY TRAINING COURSES for foremen and supervisors started recently by the British Safety Council, are to be held in most major towns throughout the country during the next 12 months. Details can be obtained from the information department of the Council, 50, Westbourne Grove, London, W.2.

STONE-WALLWORK, LIMITED, announce that this year they have already manufactured eight fully-automatic moulding machines for delivery to the Continent and have a further 10 on order. These machines are the firm's latest model complete with automatic drag turnover, closing, and transfer devices.

ARDEER FOUNDRY COMPANY, LIMITED, Stevenston, Ayrshire, who recently completed delivery of six slide ladles to Sweden, have received further orders for 10 against strong competition from German and Swedish producers. The ladles, which weigh about 12 tons each, are to be delivered by the end of January.

MILLSPAUGH, LIMITED, Sheffield, have secured an order worth nearly £500,000 for a paper and board making machine for Czechoslovakia. The order was signed in Prague, with Strojimport, the Czech State buying organization. It follows a recent order secured by Millspaugh worth nearly £450,000 for a similar machine for East Germany.

THE AUSTRALIAN Iron and Steel Company, Pty., Limited, will spend £A775,000 to expand steel production at Port Kembla, on the southern coast of New South Wales. A company announcement says that an electro-arc furnace, the second to be built at the steelworks, will be the biggest in the southern hemisphere, capable of producing 60,000 tons of steel a year.

THE STEAM LOCOMOTIVE, the Derbyshire Yeomanry, is being broken up at Crewe after covering about 1,250,000 miles. It has worked the Derby/Bristol run a good deal. The Derbyshire Yeomanry crest and nameplate of the Patriot-class engine, No. 45509, was officially presented to the Derbyshire Yeomanry Regiment at a short ceremony in Derby on November 14.

TWENTY ROTAIR rotary-screw compressor air ends, recently sent by Holman Bros., Limited, of Camborne, Cornwall, to Tokyo, for installation with Japanese diesel engines into portable compressors, comprise the first shipment under an agreement signed with Mitsui Seiki K.K. by Mr. J. F. Holman, managing director, during his tour of the Far East earlier this year.

AT THE BRITISH TRANSPORT COMMISSION'S railway works, Crewe, a continuous furnace line has been installed by the Incandescent Heat Company, Limited, and their associates, Controlled Heat & Air, Limited, for the forming, hardening, and tempering of heavy locomotive leaf springs, the plates being conveyed through the hardening furnace on cast nickel/chromium chains.

AUSTRALIA HAD RECORD EARNINGS from mineral production last year. The Federal Bureau of Mineral Resources puts the value of output at almost £A236,000,000—£A19,000,000 higher than the previous best in 1956. The biggest rises were in production of iron ore, coal, copper, tungsten, and zinc. Uranium oxide, not included in the returns, is worth another £A11,000,000 a year.

Mr. J. CABARRÚS, Acoje Mining President (the Philippines), has officially announced the first shipment to Japan of 45 dry *tonnes* of nickel/platinum concentrates produced in the Philippines. The shipment—the first in Philippine mining history—is the culmination of a five-year laboratory work that led to the establishment of Acoje's nickel pilot plant last year, in Sta. Cruz, Zambales.

Mr. T. E. POTTS, managing director of British Oxygen Company, Limited, presented gold watches to 86 employees of the company's eastern region who had completed 21 years' service, at the Royal Victoria Hotel, Sheffield, on November 7. This year the presentation of awards coincided with the company's 75th anniversary, and to mark this milestone the company has adopted a coat-of-arms.

TWO SEMI-TRAILERS, manufactured by Cranes (Dere-

News in Brief

ham), Limited, were among the commercial vehicle exhibits at the Scottish Motor Show, held at the Kelvin Hall, Glasgow, from November 10 to 18. There was a 12-ton single-axle suspension Spacevan and a standard 12/14-ton two-axle-in-line suspension flat platform semi-trailer. Both semi-trailers were demonstrated coupled to a Ford Trader tractor unit.

CANADIAN AND SWEDISH SHIPBUILDERS are looking to Belfast to meet their requirements for additional skilled workers. A Canadian company has been recruiting Belfast workers for some time, and already over 50 men (experienced platers and shipwrights) have gone to work in their shipyard at St. John's, New Brunswick, their air fares paid by the company. Another 40 platers are expected to follow them soon.

DISTINGTON ENGINEERING COMPANY, LIMITED, Workington, are to build a Concast continuous casting machine for Tube Investments, Limited, at their Round Oak Steel Works, Brierley Hill, Staffordshire. The machine will be the pilot plant for experimental and research work for special products for the whole of the Tube Investments group. It will be a single-strand unit designed to cast killed carbon steels into 2- and 6-in. sections.

ANDERSON BOYES & COMPANY, LIMITED, mining machinery manufacturers, Motherwell, has placed an order for a £55,000 1202 computer and ancillary equipment with International Computers & Tabulators, Limited. The contract was placed at an ICT private exhibition of electronic data-processing equipment held in Glasgow recently. The computer will be used at the firm's Motherwell works for stock and production control.

STRUCTURAL WORK on a big solar furnace, to be used for research at the University of New South Wales, Australia, has been completed. Work will start shortly on installing the mirrors. The furnace will concentrate the sun's rays into a beam as thick as a man's thumb, to produce a concentrated heat of 4,000 deg. C., sufficient to melt steel in seconds. Research work with the furnace will include the growth of crystals and the purification of substances.

WORK BEGAN ON THE ROADS for a new industrial site at Sheffield on November 8. The 31 acres on the Roman ridge at Wincobank is being levelled into tiers by Boden Developments, Limited. A new 40,000-sq. ft. plant for Universal Metal Sprayers, Limited, is now being constructed there, and among other firms with sites earmarked are the Cleveland Plant & Machinery Company, Limited, Beeley Foundry Light Castings, Limited, and Steel Grinding, Limited.

GUEST SPEAKER at the November luncheon of the Non-Ferrous Club in Birmingham, Miss Olga Franklin spoke about her experiences some years ago in the metal trade and of more recent experiences in Soviet Russia. Describing changes in Russian life since the death of Stalin, she laid stress on the paucity of consumer goods available to the Russian public. She attributed distribution difficulties to some extent to the absence of "middle-men." At the luncheon a collection, taken on behalf of the Earl Haig "Poppy Day" fund, realized the sum of £38 10s. 4d.

MR. C. R. WHEELER, president of the Iron and Steel Federation, was the guest of honour at the silver jubilee dinner in Birmingham on November 17 of Ductile Steels, Limited. Speaking of the Common Market, he said that Britain now faced a reversal of the trade situation that prevailed when the Ductile group was formed. When it became a public company in 1936 the UK was emerging from a free-trade system into an era of tariff restrictions. Most businessmen, he added, had a tradition of the liberal idea of free trade and the Common Market was, ironically enough, a return to that state.

Obituary

MR. L. G. FOKES

Mr. Lionel G. Fokes, editor of our sister journal *Iron and Coal* from 1928 to 1944, died suddenly at Walton-on-Thames on Friday last, aged 77. He was trained as an electrical engineer in the mains department of the Sheffield Corporation and at the local University. For many years he was closely connected with the electrification of collieries and, during this period, contributed many articles to the technical Press, and was the author of the *Mining Electrician's Handbook*. In 1919, he joined the staff of *Iron and Coal* and was appointed editor in 1928. Restrained, but telling in his writing, he was meticulous in his work and brought to it a keen insight, which was generally acclaimed by the industries he served. Although he resigned from the editorial chair in 1944 owing to ill-health, he continued to serve on the journal's staff right up to his death.

Though of slight stature, Mr. Fokes possessed unbounded energy. His hobbies were reading and writing and he ended his life amongst books, for he collapsed and died in the reference room at the public library near his home at Walton-on-Thames. A charming and courteous colleague, he will long be missed at John Adam House.

Mr. WILLIAM T. MITCHELL, chairman of the Grahamston Iron Company, Limited, Falkirk, has died at the age of 79. A son of Wm. T. Mitchell, who founded the firm in 1868, Mr. Mitchell was educated at Falkirk High School and Daniel Stewarts College, Edinburgh.

Mr. A. DENHAM, president of the Halifax Building Society, 1945 to 1961, who died on November 6 at the age of 76, had been chairman of J. Blakeborough & Sons, Limited, engineers, Brighouse, and was a director of the parent company, Glenfield & Kennedy, Limited, engineers.

Mr. FREDERICK BIRCHALL, founder of the firm of Peglers, Limited, brassfounders, Carr Hill, Doncaster, has died at the age of 91. He was managing director of the firm from 1914 to 1938, when he retired. He later became chairman and retired from this position in 1947.

Managing director of Controlled Heat & Air, Limited, Smethwick, since 1945, Mr. ROBERT DAVIDSON MACMILLAN has died aged 58. Born in Glasgow, Mr. MacMillan served his apprenticeship with A. & J. Inglis, Limited, marine engineers and shipbuilders, and in 1927 went to the Pneumatic Conveyance & Extraction Company, of Manchester: later he served with the Carrier-Owen Engineering, Limited, London. He joined Controlled Heat & Air in 1933 as chief designer.

The oldest employee of Taskers of Andover (1932), Limited, trailer manufacturers and agricultural engineers, Mr. H. SMALLBONES has died, aged 78. His spare-time hobby was making models of engines that had been manufactured in the works. A model of Taskers' most famous traction engine, the "Little Giant," which took him 13 years to complete, won him a silver medal and diploma in London. With two others, it is exhibited in the boardroom of the firm. Mr. Smallbones was awarded the B.E.M. in 1959 for loyal service to the company.

Translation Services

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

BISI 1621 DETERMINATION OF OPERATING CONDITIONS OF STEELWORKS CRANES AND CHECKING THE BASIS FOR SELECTING THEIR DIMENSIONS. (From German.) Svenson, and W. Schweer. *Stahl Eisen*, 1960, *80*, Jan. 21, 79-90. (£7 5s.)

BISI 2211 INFLUENCE OF OXYGEN PRESSURE ON THE OXIDATION RATE OF PURE IRON. (From German.) Rahmel A., and H. J. Engell. *Arch. Eisenhütt.*, 1959, *30*, Dec., 743-746. (£3.) Experiments are described, from which it is shown that O_2 pressure has no detectable influence on the kinetics of oxidation of pure iron at 700, 800, and 950 deg. C., either in pure O_2 at pressures of 100-600 mm., or in a stream of O_2/A mixtures between 7 and 760 mm. (*JISI* abstract 1960, June, 246.)

BISI 2323 EFFECTS OF NOISE ON WORKERS IN THE IRON AND STEEL INDUSTRY. (From German.) Jansen, G. *Stahl Eisen*, 1961, *81*, Feb. 16, 217-220. (£2 15s.) In addition to the danger of impaired hearing as a result of noise, we also have to consider the unfavourable effects on the vegetative reactions of the human organism. The task of preventing such effects is one which must be considered in any noise-abatement programme. Vegetative disturbances are more severe than was hitherto supposed. They are particularly liable to occur on exposure to wide band noises and are observed both on persons who are at rest and those engaged in bodily work. This finding was confirmed by a comparative examination of 1,005 iron and steelworkers. Research into circulatory disorders in human beings as a result of noise is being continued. (Author's summary.)

BISI 2333 DETERMINATION OF THE OXYGEN CONTENT OF ALUMINIUM KILLED STEELS. (From German.) Koch, W., and K. Abresch. *Stahl Eisen*, 1961, *81*, June 8, 795-800. (£4 5s.)

BISI 2336 DEGASSING OF LIGHT-METAL ALLOYS BY MEANS OF SONIC VIBRATIONS. (From German.) Esmarch, W., *et al. Wissenschaftliche Veröffentlichungen aus den Siemens-Werken*, (Werkstoff Sonderheft), 1940, 78-87. (£3 10s.) A method suitable for industrial use has been developed for degassing aluminium-alloys in the high-frequency furnace by a simple procedure and in a short time, using sonic vibrations. In particular the conditions were established under which complete gasification is also possible with alloys high in magnesium. (Author's summary.)

BISI 2356 SURFACE DEFECTS IN PRECISION CASTING. (From German.) Nickel, E-G. Paper given at the European Conference on Precision Casting, May 1958, Paris. 5 pp. (£4 10s.) After a division of the groups of defects the author deals in detail with the externally visible defects on precision castings. He explains the possible causes of the various defects and mentions the corresponding remedial measures.

New translations in course of preparation include:—

BISI 2461 STEELS AND CAST IRONS WITH HIGH BORON CONTENT. (From Czech.) Vrtel, J. *Hutn. Listy*, 1960, *15*, (12), 945-950.

BISI 2462 STEELS WITH OVER 1 PER CENT. BORON CONTENT. (From Czech.) Eminger, Z. *Ibid.* 955-961.

BISI 2465 A STUDY OF THE ISOTHERMAL TRANSFORMATION OF Cu, Cr AND Ni, Cr CAST IRONS CONTAINING ABOUT 0.5 PER CENT. Mo. (From French.) Sy, A. de, and J. van Eeghem. *Fonderie Belge*, 1957, May, 92-105.

BISI 2466 HARDENED CAST-IRON ROLLS FOR ROLLING MILLS. (From Czech.) Necas, O. *Hutn. Listy*, 1954, *9*, (2), 34-43; (3), 72-74.

BISI 2467 EXPERIMENTS ON THE PRODUCTION OF NODULAR CHILLED-IRON ROLLS. (From Hungarian.) Körös, B. *Koh. Lapok*, 1953, *8*, Apr., 73-82; May, 97-103.

BISI 2479 EXPERIENCE WITH MATERIALS ACCEPTANCE OF CRANKSHAFTS. (From German.) Schumann, H. *Neue Hütte*, 1961, *6*, June.

BISI 2482 INTRODUCTION OF ELECTRO-SLAG WELDING INTO THE MANUFACTURE OF WELDED CAST CONSTRUCTIONS. (From Russian.) Zaitsev, Yu.N., *et al.* Vnedrenie Novykh Sposobov Svarki v. Promyshlennost', 1959, (2), 5.16.

Under "Other People's Translations" appears:—

DUST EXTRACTION FROM THE FUMES OF ELECTRIC ARC FURNACES. Mühlrad, W. *Stahl Eisen*, 1961, *81*, (1), Jan. 5, 41-46, a translation of which was printed in *Iron Coal Trades Rev.*, 1961, *183*, Sept. 29, 669-675.

Publications Received

Copper and Copper Alloy Castings, a Companion Volume to BS. 1400:1961, published by and available from the Association of Bronze & Brass Founders, 69, Harborne Road, Edgbaston, Birmingham, 15; price (to non-members) £1 1s. (post free).

A sensible format has been chosen for this publication, and the size is such as to match that of the specification it is designed to amplify. The content of the volume—obviously written by experts in each field—has been chosen to make it of outstanding value to the engineer/designer and purchasing officer alike.

The book, which is spirally bound in glossy stiff covers, opens with a Guide to Alloy Selection and here is to be found just the type of information essential for proper co-operation between maker and user of castings, well clothing the bare bones of the BS. 1400 specification. This section is followed by one covering typical physical and mechanical properties of the various alloys. Section III: Casting Methods, provides information likely to arouse the interest of the designer for here he learns that not one, but at least six, types of processes are available to founders of non-ferrous alloys, and moreover, that some of the newer processes can ensure an unprecedented standard of dimensional accuracy. For quick appreciation, a simple table has been included to show which processes are suited to particular alloys. Sections IV and V respectively summarize the specifications and give equivalent, similar and superseded specifications, the latter section including foreign specifications also.

Section VI, with some detail, enters into the nature and properties of the major alloy groups, giving much sound advice as to their nature and application. Finally, in the last section six photomicrographs are included. These may not mean much to the average engineer, but they certainly do reveal the great difference in the structures which can be found in various metals.

As its title suggests, this booklet is designed as a companion volume to the latest British specification for copper-base alloys—it is the reviewer's opinion that they are "good companions" and should be forever inseparable.

Kodak Wratten Filters. Published by Kodak, Limited, Kingsway, London, W.C.2.

Kodak, Limited, have revised and rewritten their book "Wratten Light Filters," first published 10 years ago, under the new title "Kodak Wratten Filters." The new issue contains much additional information, and there are chapters giving technical information, about filters for black-and-white and colour photography, those for use in the graphic arts and for technical, scientific and miscellaneous uses. These chapters cover most of the applications of filters, *e.g.*, in general and colour photography, cinematography, colour printing, photomechanical work, microscopy and photometry. In the second half of the book, the spectrophotometric curve of each of the 118 filters in the "Kodak" and "Wratten" range is given, together with tabulated transmission and density values at specific wavelengths. The book, strongly bound with a hard red cover and "lie flat" pages, costs 12s. 6d.

A PIECE OF SCULPTURE in aluminium, designed for a new hall of residence, Leeds University, measuring 21 by 20 ft. and weighing 30 cwt., has been cast in sections by the North Road Foundry (Ferrybridge), Limited, from metal supplied by Alcan-Enfield Alloys, Limited.

Company News

TRIPLEX FOUNDRIES GROUP, LIMITED—An interim dividend of 5 per cent. has been declared.

JOSEPH LUCAS (INDUSTRIES), LIMITED—Net profit for the year ended July 31, 1961, is £2,526,350 (£2,923,424) and the company is repeating the dividend of 2s. 9d. per £1 ordinary.

GAS PURIFICATION & CHEMICAL COMPANY, LIMITED—Following a net loss of £45,959 (£397,726 profit) for the year ended June 30, 1961, no dividend is recommended, against a total of 35 per cent. for 1959-60.

HALE & HALE (TIPTON), LIMITED—Group net profit for the year ended August 4, 1961, rose to £29,884 (£19,680), after tax of £18,845 (£10,959). A final dividend of 15 per cent. (same) maintains the total at 20 per cent.

METAL INDUSTRIES, LIMITED—Interim dividend in respect of the year to March 31, 1962, is being maintained at 6 per cent. The 1960-61 total was 15 per cent. The company reports increased profits for the half year to October 1, 1961.

PRESSED STEEL COMPANY, LIMITED—Partly due to unofficial strikes, the directors state that results for 1961 are likely to be "most disappointing" and the company is not paying an interim dividend. An interim of 9 per cent. was followed by a final of 21 per cent. for 1960.

R. & J. DICK, LIMITED, power transmission engineers, of Glasgow—Group profit for the year to August 31, 1961, fell to £52,472 (£136,122), before tax of £29,886 (£65,054), and the dividend of 10 per cent. compares with 17½ per cent. equivalent after adjusting for one-for-one scrip issue.

LEEDS FIRECLAY COMPANY, LIMITED—Group trading profit of £105,788 in the year ended June 30, 1961, compares with a previous loss of £24,582, and the net profit is £58,350 (£49,926 loss). Dividends are resumed with 6 per cent. on the preferred ordinary and 4 per cent. on the ordinary stock.

HEENAN GROUP, LIMITED, manufacturers of hydraulic presses, locomotives, and precision castings, etc.—With a final of 8 per cent. total dividend for the year to September 2, 1961, is being raised to 13 (11¼ equivalent) per cent. Net profit was £298,395 (£282,748) after tax of £663,742 (£564,387).

CHARLES ROBERTS & COMPANY, LIMITED, carriage and wagon builders, financiers, etc., of Horbury Junction, near Wakefield—Group net loss of £911,710 was incurred in the year ended March 31, 1961, compared with a previous deficit of £284,060. No dividend is recommended on the ordinary capital. The preference dividend has been paid.

OPPERMAN GEARS (HOLDINGS), LIMITED—It is proposed to issue to the Limitorque Corporation of Philadelphia 200,000 ordinary 1s. shares in the company at 3s. 3d. a share and to grant an option to subscribe for a further 400,000 shares at 4s. a share at any time on or before December 31, 1963. The two companies already have a trading association.

BIRMINGHAM SMALL ARMS COMPANY, LIMITED—Net profit for the year to July 31, 1961, is £1,372,745 (£1,663,748), after tax of £1,560,000 (£1,754,800). A final dividend of 7½ per cent., makes 11¼ per cent. for the year, which is the same equivalent dividend as previously when, however, holders received a special centenary payment equal to 3¼ per cent., not subject to tax.

J. BROCKHOUSE & COMPANY, LIMITED, manufacturers of axles, dropforgings, iron and steel castings, etc., of West Bromwich (Staffs)—An unchanged 8½ per cent. final dividend for the year to September 30, 1961, maintains the year's total at the higher 12½ (10) per cent. rate paid for the previous year. After tax of £641,225 (£544,094), the profit balance is £613,820 (£563,268).

CHARLES WINN & COMPANY, LIMITED, manufacturers of valves, screwing and tapping machines, etc., of Birmingham—Final dividend is raised to 7 (5) per cent., and, in addition, a special dividend of 2 per cent. is recommended, making a 12 (7½) per cent. total for the year ended July 31, 1961. Group net profit of £87,813 (£37,145) constitutes a record. Net profit is £42,415 (£25,789).

PICKFORD, HOLLAND & COMPANY, LIMITED—In his review of the year ended July 2, 1961, Mr. Ronald Steel, the chairman, said that current sales are running considerably below last year's, and the firm's brick-making plants are not fully occupied. Consequently, unless there is an immediate upturn in orders, the excellent financial results of the year ended July 2 may not be repeated.

GLOUCESTER RAILWAY CARRIAGE & WAGON COMPANY, LIMITED—On behalf of his own and family holdings of over 50,000 shares, Mr. S. E. Scammell is to circularize shareholders of the company setting out reasons why the bid by Winget, Limited, which he considers, "grossly inadequate," should be rejected. Mr. Scammell finds it "impossible to perceive how even liquidation could produce less than 20s. a share."

WALMSLEY (BURY) GROUP, LIMITED, machinery makers and engineers, of Bury (Lancs)—The order-book currently stands at a level higher in value than ever before, reports Mr. P. Holland, the chairman. Since January, orders for complete paper and board-making machines have been obtained for mills in eight countries, including an order from Russia worth over £3,500,000. Over 75 per cent. of orders on hand are for export to 28 countries.

SOUTH AFRICAN IRON & STEEL INDUSTRIAL CORPORATION, LIMITED (ISCOR)—Sales for 1961 were down at R.112,500,000 (R.116,000,000), including exports at R.8,800,000, but net earnings, after tax, were up at R.22,400,000 (R.22,200,000). Mr. F. Meyer, the chairman, states that three quarters of the R.560,000,000 expansion scheme will be spent locally. The first part of the extension at Vanderbijl Park should be in operation by 1966 and the second by 1969.

GUEST, KEEN & NETTLEFOLDS, LIMITED—Down-turn in trading conditions in the UK and the pressure on profit margins have continued with increasingly severe effect on the results of the group. The profits of the steel companies are particularly affected, the directors state. Pre-tax profits may fall by some £7,000,000 to £8,000,000 from the record profit of £30,800,000 earned in 1960. The interim dividend is maintained at 5 per cent. on the ordinary capital increased by a one-for-six rights issue and the final dvidend is likely to be held at 11 per cent. The steel companies have not only been affected by reduced demand, in common with the rest of the industry, but to a greater extent by the decline in profit margins. "This decline is largely due to the fact that the Iron and Steel Board, which controls the industry's selling prices, has refused to take proper account of increases in coal and fuel oil prices, wages, and other items of cost. The largest overseas company, John Lysaght (Australia) Pty., Limited, after a satisfactory start to the year, has been seriously affected by the recession in many parts of the Australian economy, notably the motor vehicle and domestic appliance industries, the directors state.

Personal

Mr. B. CAWDRON has become a director of the Metal Box Company, Limited.

Mr. TIMOTHY MIDDUP has been appointed works manager of Midco Steam Specialities, Limited, founders and engineers, Queens Drive, Nottingham.

Col. N. F. WRIGHT, disposal officer, Rolls-Royce, Limited, Derby, has been appointed a member of the North Midlands National Industrial Salvage and Recovery Council.

Mr. ROBERT BROADBENT, Mr. CHRISTOPHER S. GARDNER and Mr. RONALD HUTCHINSON SEWARD have been appointed additional directors of the British Thermostat Company, Limited.

Highfield Gear & Engineering Company, Limited, have appointed as chairman of the company Mr. J. T. SCHOFIELD, who for the past three years has been managing director of the company. He succeeds the late Mr. G. W. SMITH.

Mr. W. E. A. REDFEARN, director of English Steel Corporation, Limited, and managing director of English Steel Forge & Engineering Corporation, Limited, has joined the board of Firth-Vickers Stainless Steels, Limited.

Major M. J. WEBB has been appointed chairman of Midland Industries, Limited, Heath Town Works, Wolverhampton, in succession to Mr. JOHN HARPER BEAN, C.B.E., who will retire from that post but continue on the board.

Mr. ALLAN HEPWORTH, general manager of Hepworth & Grandage (Yeadon), Limited, has been appointed a director of the company. He joined the parent company, Hepworth & Grandage, Limited, of Bradford, as an apprentice.

Mr. L. D. GUNNELL, executive director since 1955 of Foster Electrical Supplies, Limited, a company in the Metal Industries group, is to retire at the end of the year after 40 years' service. He is to continue his association with the company as consultant.

Following the resignation of Mr. A. M. SIMMERS, who has taken an appointment with Vickers, Limited, Mr. P. H. MORWOOD has been appointed secretary of the English Steel Corporation, Limited, and Mr. A. TAYLOR, special director, chief accountant of the Corporation.

Mr. H. KAY has been appointed assistant managing director of the engineering division of Tube Investments, Limited. Mr. Kay is at present deputy managing director of the marine division of Richardsons Westgarth & Company, Limited, of Wallsend, Northumberland.

Brigadier A. LEVESLEY, a director of Edgar Allen & Company, Limited, Sheffield, has been appointed president of the Welded Tool Manufacturers' Export Association and of the Welded Tool Manufacturers' Association, in succession to Mr. R. P. WALLACE of Jessop-Saville, Limited.

Mr. S. R. GRAY has recently been appointed southern area sales manager for Cranes (Dereham), Limited, trailer and semi-trailer manufacturers, and the recently formed Crane Fruehauf Trailers, Limited. He will be based at the London office at 8 York Buildings, Adelphi, London, W.C.2.

Mr. MERVYN A. FUDGE has been appointed director and general manager of the Tenuous Steel Company, Limited, Rotherham, by Firth Cleveland Steel, Limited. Since 1956, he has been company secretary of Firth Cleveland Steel Strip, Limited, Tipton, Staffs, and for the time being he will retain this position.

The REV. JOHN ROGAN, industrial chaplain in the Diocese of Sheffield since 1957, has been appointed secretary of the industrial committee of the Church Assembly Board for Social Responsibility, at Church House, Westminster. The committee undertakes the promotion and co-ordination of the thought and action of the church in relation to industry.

Mr. J. A. KEMP has relinquished his position as a director of Albion Motors, Limited. Two years ago he retired from his appointment as chief designer, and since then has served the company as engineering consultant. His colleagues and friends at Scotstoun recognized the occasion by presenting him with a nest of tables and a standard lamp.

Mr. ALAN RANDALL REES-REYNOLDS, a partner in Joynson-Hicks & Company, Limited, has been elected to the board of Pollard Ball & Roller Bearing Company, Limited. He is a director of Blundell-Permoglaze, Limited, Graham Firth Steel Products, Limited, and Metal Moulds, Limited, all of which are companies in the Brightside Engineering Holdings group.

Vokes Group, Limited, announce the appointment of Mr. F. V. SMITH as director and general manager of their Scottish subsidiary company, Robert Kellie & Son, Limited, Dundee, old-established manufacturers of food-processing and special-purpose equipment. Mr. Smith, who took up his new appointment in early November, has been 21 years with Vokes, the last 15 in the capacity of production and purchasing controller.

Mr. D. E. F. CANNEY has been appointed an additional managing director of George Angus & Company, Limited. He will assume control of the group's manufacturing and trading interests in fire-fighting and safety equipment. Mr. A. PROCTER will continue as managing director, engineering divisions. Mr. D. D. ANGUS will continue as managing director, general dvisions, and will assume control of the group's manufacturing and trading interests in belting and rubber hose.

Mr. G. N. F. WINGATE, director and general manager of Distington Engineering Company, Limited, has been appointed chairman of Barrow Steel Works, Limited, following its recent acquisition by the United Steel Companies, Limited, from the Iron and Steel Holding and Realisation Agency. Mr. A. JACKSON, technical adviser on steelmaking to United Steel, Mr. T. G. MARPLE, general manager of Barrow Steel Works, and Mr. E. T. SARA, assistant general sales manager of United Steel, have been appointed directors of Barrow Steel Works. Mr. A. J. PEECH, deputy chairman and general managing director of United Steel, remains a director. Sir WALTER BENTON JONES, the chairman of United Steel, and Mr. LANGTON HIGHTON, have resigned from the Barrow board.

Mr. ALLAN AVISON, deputy managing director of the David Brown Corporation, Limited, recently completed half a century with the concern. He started at the age of 14 as an office boy, but transferred to an apprenticeship. He became chargehand before he was 21, and then a foreman. Later he took charge of the company's commercial and sales activities. Mr. Avison was in charge of the Park Works at Huddersfield of the David Brown organization before and during the second world war, and afterwards became general manager of the gear group of companies. He has negotiated many orders from Russia and has travelled widely for the firm. Those present at a luncheon in honour of Mr. Avison's 50 years' service included Mr. David Brown, the chairman, Lord Brabazon of Tara, and Lord Boothby.

Raw Material Markets

Iron and Steel

There is no shortage of any type of foundry pig-iron; in fact most furnaces have good stocks and output could be increased considerably. The demand for castings from the motor industry are at a lower level than they have been for some time, and it is now thought that it will be the spring before any improvement shows itself. The demand from the heavy engineering and speciality foundries keeps up to a reasonably good level but there is no pressure from any industry.

The light foundries are short of work and the makers of building castings are not likely to see any improvement until the winter is over. The jobbing foundries, too, could do with more business than is forthcoming.

The re-rollers are in most cases short of business for small bars, light sections, and strip and consequently are keeping their stocks of billets at a minimum level. Even the steelworks' trade in carbon and alloy steels is much easier, due no doubt to the lesser demands from the dropforging industry. There is also a lessening demand for reinforcing bars.

Some of the steelworks have stocks of defectives and crops and are finding difficulty, in view of the depressed state of the re-rolling trade, in getting rid of their arisings in this class of steel.

Non-ferrous Metals

The reduction in the US lead price by ½ cent. a pound in New York and in St. Louis at the beginning of last week brought the price down to 10 cents. and 9.80 cents. per pound, respectively. At the same time, the big Canadian producer and refiner, Consolidated Mining & Smelting, lowered its price for lead by ½ cent. to 10 cents. a pound. Although the US price had been suspect for a long time, the initial reaction in London was to drop the quotation by £2 10s. to approximately £57 7s. 6d. per ton. However, at the lower price level, consumers became more interested and selling pressures were absorbed, trading became quite active, and the quotation recovered its initial loss. Even so, the outlook is still not good, there is ample metal available, and the prospects are for a resumption of the downward trend.

Zinc has been under pressure on both sides of the Atlantic. In London, arrivals of USSR metal has been a depressing influence, while in New York, rumour has it that the official quotation will soon be lowered. This latter feeling gained more credence last week by the cut in the Canadian price of zinc by ½ cent. to 11½ cents. a pound. Nevertheless, the US quotation is still unaltered at 11½ cents. a pound and the London price continues to fluctuate narrowly around £68 a ton. The outlook is for a continuance of the present featureless markets and a softer, if more sensitive, price trend.

Tin is a relatively quiet market in London and in New York, although it is fairly active in the East. In London and New York demand is satisfactory without being particularly heavy and the reduction in refined tin held in LME warehouses—the first fall in stocks for several months—dampened buyers' enthusiasm. The market in Singapore was for a short time affected by the quieter conditions apparent in London but soon shrugged off this lethargic feeling and is once more going ahead, dragging London and New York up with it. The London price is around £970 a ton and, if it is true that cash supplies are becoming difficult, the quotation should go higher. In New York, the price is around $1.24 a pound and the immediate trend will depend on a continuance of optimistic forecasts about business in the months ahead.

Copper is featureless in London and flat in New York where the price is unchanged at 31 cents. a pound. The London quotation is fairly steady around £229 a ton and is being sustained, partly by demand and covering operations and partly, too, by the renewed unrest in the Congo. In any event, the undertone is sensitive to influences, either bullish or bearish.

Asquith Machine Tool Corporation

Mr. Robert W. Asquith, chairman of the Asquith Machine Tool Corporation, Limited, Halifax, has been appointed managing director of the Corporation—a newly-created post. In view of this appointment, Mr. Asquith has resigned as managing director of William Asquith, Limited, but retains his post as chairman.

Mr. J. D. H. Horobin and Mr. G. W. Wright have been appointed joint managing directors of William Asquith, Limited. They are respectively group financial and group technical directors of the Corporation. Mr. H. Booth, secretary of William Asquith, has been appointed a director of the company.

Due to the Shrewsbury works being transferred to R. Woodvine & Son (Shrewsbury), Limited, another subsidiary of the Corporation, Mr. J. G. R. Woodvine, who is managing director of the latter company, has resigned from the board of William Asquith, Limited.

Mr. G. E. Hickman, of Drummond Brothers, Limited, has informed the board that he desires to retire from the chairmanship and joint managing directorship of the company as at September 30, 1962, by which time he will have completed more than 60 years' service with the company. Accordingly the board has nominated Mr. Robert W. Asquith to become chairman, and Mr. C. J. Casben to be managing director as from October 1, 1962. In the meantime Mr. Asquith will retire from the position of joint managing director and become deputy chairman, and Mr. Casben, who is at present director and general manager, will become joint managing director. Mr. A. D. George and Mr. W. G. Hunt have been appointed additional directors of the company.

Reorganization at BWRA

The British Welding Research Association announces that under a new arrangement, which came into effect on November 1, the former welding process and resistance welding sections have been integrated into one Welding Technology Department. Terms of reference include carrying out such research as is necessary to extend the range of usefulness of existing welding processes, to promote the effective use of welding methods, to assist in the selection of processes for particular applications and to provide basic data for the design of welding plant. Administration of the new department is the responsibility of Mr. P. T. Houldcroft.

Latest Foundry Statistics

Copper-base Castings. The British Bureau of Non-Ferrous Metal Statistics in its *Bulletin* for November reports that the production of castings during September was 6,879 tons. This output is below the monthly average for the year, which so far has been running at about 6,970 tons. The first nine months of this year showed a production of 62,733 tons as against 65,293 tons last year.

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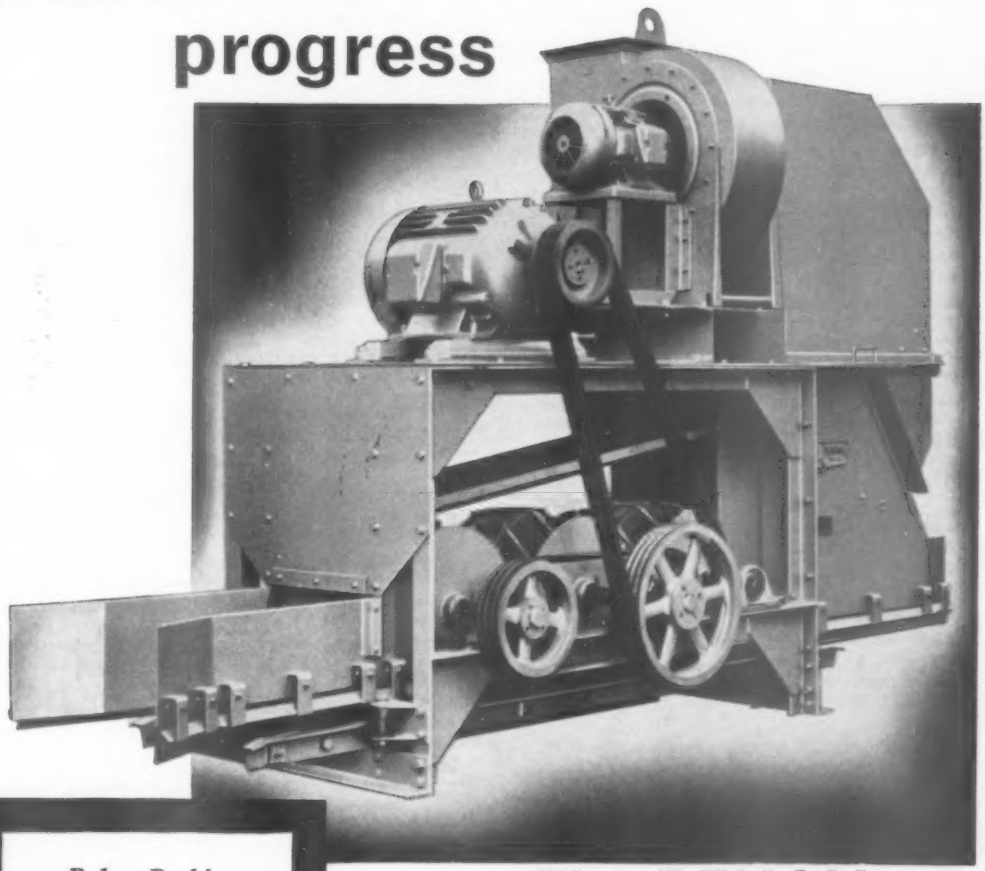

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated. Prices following side headings marked* are subject to an increase of 1 per cent. under Iron and Steel Board Price Determination, 1961, No. 2.)

November 22, 1961

PIG-IRON

* **Foundry Iron.**—No. 3 IRON, CLASS 2, 10-ton lots or over, Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

* **Low-phosphorus Iron.**—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham; £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

* **Hematite.**—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; South Wales (Welsh iron), £23 19s. 0d.

* **Basic Pig-iron.**—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy, 75 per cent. Si, £62 10s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 14s.1d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 9s. 1d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 12s. 1d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £80 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 10½d. to 2s. 1d. per lb. Cr. * Average 68-70 per cent.

Metallic Chromium.—98/99 per cent., 6s. 9d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 0d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

* **Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft u.t., 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.4! to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C; £40 11s. 0d.; silico-manganese, £43 4s. 0d.

* **Billets, Blooms, and Slabs for Forging and for Stamping** 50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

FINISHED STEEL

* **Heavy Plates and Sections** (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

* **Small Bars, Sheets, etc.**—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 16s. 0d.; nickel-chrome, £100 18s. 0d.; nickel-chrome-molybdenum, £113 11s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £228 15s. 0d. to £229 0s. 0d.; three months, £228 5s. 0d. to £228 10s. 0d.; settlement, £229 0s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 2½d. per lb. rods, 243s. 6d. per cwt. basis; 20 s.w.g., 278s. 6d. per cwt.

Tin.—Cash, £959 0s. 0d. to £960 0s. 0d.; three months £966 0s. 0d. to £966 10s. 0d.; settlement, £960 0s. 0d.

Lead (Refined Pig).—Second half November, £59 12s. 6d. to £59 15s. 0d.; second half February £60 15s. 0d. to £61 0s. 0d. settlement, £59 15s. 0d.

Zinc.—Second half November, £68 12s. 6d. to £68 15s. 0d., second half February, £69 15s. 0d. to £70 0s. 0d.; settlement; £68 15s. 0d.

Zinc Sheets etc.—Sheets, 15g. and thicker, all English destinations, £105 17s. 6d.,, rolled zinc (boiler plates), all English destinations, £103 12s. 6d.; zinc oxide (Red Seal); d/d buyers' premises, £85 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes 1s. 9½d. per lb.; sheets to 10 w.g., 195s. 6d. per cwt.; wire, 2s. 8½d.; rolled metal, 195s. 6d. per cwt.

Brass (Brazing).—BS1400, SCB2, £176; SCB3, £172.

Brass (High Tensile).—BS1400, HTB1, £192; HTB2 £211; HTB3, £227.

Gunmetal.—BS1400, LG2, £209; LG3, £220; G1, 1½% £279; G1 ½% £293.

Phosphor Bronze.—BS1400, PB1 (AID released), £313; PB4 £299; BS1400, 90/10/1%, £299.

Leaded Phosphor Bronze.—BS1400, LPB1, £235.

Phosphor Bronze Strip, etc.—Strip, 300s. 3d. per cwt.; wire, 4s. 2½d. per lb.; rods, 3s. 4¾d.; tubes, 3s. 4¾d.; chill cast bars, solids 3s. 5½d.; cored, 3s. 6½d. (CHARLES CLIFFORD LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11¾d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £230 0s. 0d. Quicksilver, ex-warehouse, £59 0s. 0d. Nickel, £660 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £237 AB2, £245.

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New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.).

854,427. H. J. Daussan, 9, Avenue Leclerc de Hautecloque, Metz (Moselle), France.

Improvements in and relating to a device for forming a screen against the inner face of the upper part of an ingot mould.

854,440. J. H. V. Williams, W. S. Williams, J. H. Williams, and J. X. Williams, all of Brycoed House, Trideanaw, Swansea.

A method of preventing scale on the inner surfaces of ingot or other moulds. Air is passed under pressure through molten metal in a sand mould in which the ingot is cast for a period which is determined by the expression—$T = K, W \times t$ deg. C./1,250 — where T is the time during which air is supplied after the sand mould has been filled; W is the weight of the ingot mould in tons; k, is a constant which is not less than 5; t is the temperature in degrees centigrade of the metal while being poured. The air is caused to emerge from the molten metal at a position adjacent to that at which phosphorus-rich iron normally segregates into a pipe.

855,156. Hermann Sauter and Wilhelm Hahn, 14 Koenigstrasse, Stuttgart-N, Germany.

Die-casting apparatus which attempts to make possible on the one hand the quick and easy evacuation of the mould cavity, and on the other to make it possible to avoid the evacuating passage becoming significantly stopped up and to enable the hardened cast material to be removed from the mould cavity without appreciable difficulty.

855,495. W. M. Goldhamer, 2918, Huntington Road, Shaker Heights, Ohio, USA.

The die-casting apparatus claimed in this invention is stated to make it possible to remove in one piece the casting and the connecting metal which solidified in the passageway, thereby clearing the passageway for the next cycle.

856,554. Erwin Buhrer, 117 Alpenstrasse, Schaffhausen, Switzerland.

A device for handling a top distributor pattern for a foundry mould. The device includes—an upright stand; overhanging clamping means for gripping the pattern, mounted for angular displacement about a transverse pivot on the stand, and for displacement in the lengthwise direction of the stand; and means for displacing the clamping means. The arrangement is such that a complete separation of the top distributor pattern from the clamping means may be effected between depositing the top distributor pattern on the patternplate assembly and the lifting thereof from the finished mould.

856,785. United Kingdom Atomic Energy Authority, London.

Methods of casting uranium are the particular concern of this Patent, the principal objective of which is to provide a process for producing castings of fine grain and with a minimum of pipe or porosity. This, it is claimed, can be done by pouring the metal into a mould under vacuum and vibrating the mould during the pouring.

856,820. Erwin Buhrer. (Address as for No. **856,554**.)

Apparatus for transporting or transferring foundry moulds, *i.e.* mould halves and moulding flasks, from and to a conveyor as well as for effecting the assembly or closure of such mould halves or flasks. In the apparatus, at least one lifting device, carrying a vertically-movable positively-guided clamping device for automatically gripping and releasing the moulds, is movable in a closed circuit so that it passes first along the feed conveyor and then along the delivery conveyor.

856,994. Sterling Aluminium Products, Inc., 2600, North Third Street, St. Charles, Missouri, USA.

Moulding machines for casting pistons, in particular those made of aluminium and its alloys. This Patent is an improvement of the invention previously claimed in B.P. 721,245. (See also for reference B.P. 753,877, FOUNDRY TRADE JOURNAL, October 4, 1956.)

857,132. Midland Silicones, Limited, 68, Knightsbridge, London, S.W.1.

Foundry core and sand composition. This comprises: (1) At least 90 per cent. by weight of sand; (2) a binding quantity of up to 10 per cent. by weight (calculated on the weight of the composition) of an aqueous dispersion of an alkali metal silicate—this has a silicate concentration of at least 10 per cent. by weight of a silica to alkali metal oxide ratio of at least 0.5 to 1; (3) a small proportion of an organo-silicon additive which is compatible with the aqueous-silicate solution, and which has an average of from 0.9 to 1.7 monovalent aliphatic hydrocarbon radicals per silicon atom in the polymer molecule, and wherein there is contained at least 3 per cent. by weight of silicon-bonded organic substitutes consisting of alkoxy radicals having from 1 to 6 carbon atoms. The organo-silicon additive is present in the composition in an amount between 1 and 15 per cent. by weight, calculated on the weight of the aqueous-silicate dispersion in the composition.

857,188. Sulzer Freres, S.A., Winterthur, Switzerland.

A method of producing moulds for foundry purposes—particularly in the precision-casting process. A pattern is made to which combustible fibrous material such as cellulose or those containing keratin, is added. A mould is then formed with the aid of this pattern, and the pattern is then removed by dissolving it out with a solvent—the mould then being subjected to firing treatment.

857,237. Enfield Rolling Mills, Limited, Brimsdown, Enfield, Middx.

An improved water-cooled mould for use in the semi-continuous casting of metals.

857,262. Société Anonyme Pour L'Industrie de L'Aluminium, Chippis, Valais, Switzerland.

A float for regulating the flow of metal in the continuous-casting processes, whereby an advantageous distribution of the metal is ensured so that ingots of large cross-section can be cast without the formation of cracks.

857,369. Wieland-Werke A.G. Ulm/Donau, Olgastrasse, 147, Germany.

Moulds or mandrels having an interior cavity for cooling fluid, for the continuous casting of metals. The walls of the mould cavity or the outer walls of the mandrel are composed of graphite or a material containing graphite.

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SITUATIONS WANTED

SENIOR FOUNDRY PLANT ENGINEER seeks change, 18 years of senior experience, buildings, developments and all mechanised foundry plant; both Mec., Elec. Box SF202, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST / ASSISTANT FOUNDRY MANAGER, aged 39, A.M.I.B.F., N.F.C. Diploma, seeks interesting progressive post. Experienced modern foundry methods, technical control and development. Box FM157, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER (50), A.M.I.B.F., seeks a position, Lancashire and W.R. Yorkshire. Life experience in trade, machine tool castings up to 20 ton, jobbing, repetition, CO_2, ferrous, non-ferrous, practical, technical, commercial. Excellent references and results, hard-working, conscientious. Box FM187, FOUNDRY TRADE JOURNAL.

WORKS CHIEF-CHEMIST, 37, fully conversant with complete analysis of pig-iron and allied materials, extensive foundry experience, holder of Ord.Nat.Cert. Metallurgy, A.M.I.B.F., and four subjects at L.I.M. level, including foundry-practice, desires suitable post in the Midlands. Box WC199, FOUNDRY TRADE JOURNAL.

YOUNG FOUNDRY METALLURGIST with five years in modern malleable foundry, and three years in research, seeks position in London or the London area preferred. Experience in cupola control, shell-moulding, CO_2 process, etc. Box YF196, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE desires change. First-class connections foundry trade. Good education. Technical experience. Undertake sale of foundry supplies, castings, binders, plant. Scotland. Box TR190, FOUNDRY TRADE JOURNAL.

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FOUNDRY FOREMAN required, experienced in loam, dry sand and green sand moulding of large range of Engineering Castings up to 10 tons. House provided. Write full particulars including salary required. Box FF206, FOUNDRY TRADE JOURNAL.

YOUNG METALLURGICAL ASSISTANT required to take charge of routine cupola and sand control in foundry producing grey and high duty iron castings. South London area. Write Box YM201, FOUNDRY TRADE JOURNAL.

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SITUATIONS VACANT—*contd.*

WORKS MANAGER wanted, under 45 years, for Whiteheart Malleable Foundry, West Midlands. Mechanised Moulding Unit, Stump Moulding, Core Shop, Cupola Melting, Oil Fired Annealing. Give full career and salary. Apply Box WM200, FOUNDRY TRADE JOURNAL.

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TILTING FURNACE, preferably lip axis, oil or gas fired, ½ ton brass capacity or larger, state make and type. Box TF173, FOUNDRY TRADE JOURNAL.

WANTED. SAND SLINGER, 3 ft. or 5 ft. radius, suitable for 400 V. 50 C. 3 PH. Stating age, condition, where lying and approximate price. Box WS183, FOUNDRY TRADE JOURNAL.

WANTED. One 400/500 lb. capacity Motorised Oil Sand Mixer in good condition suitable for 400/440 volts supply. WANTED. One 2 ton capacity Oil Fired Receiver for Cast Iron in good condition. Box WO193, FOUNDRY TRADE JOURNAL.

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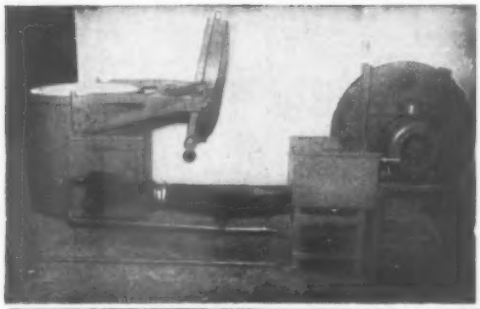

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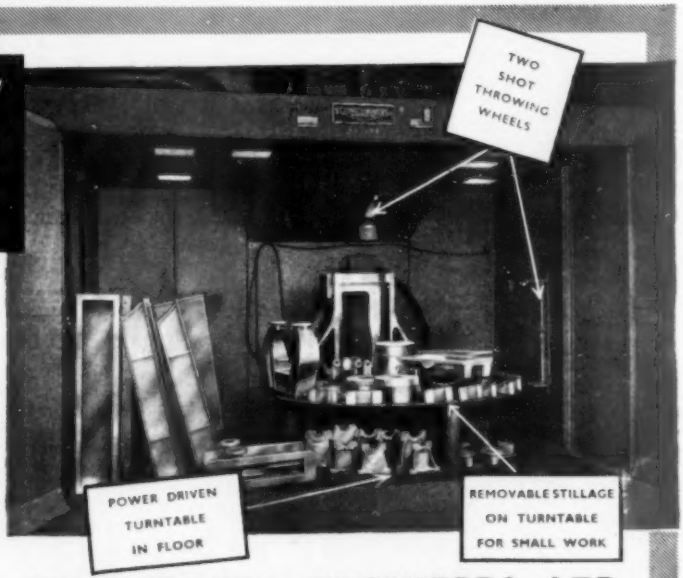

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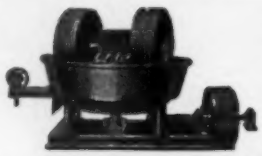

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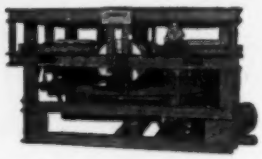

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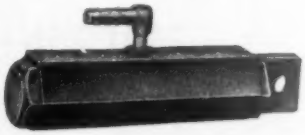

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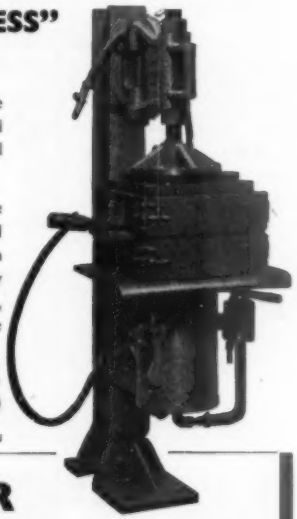

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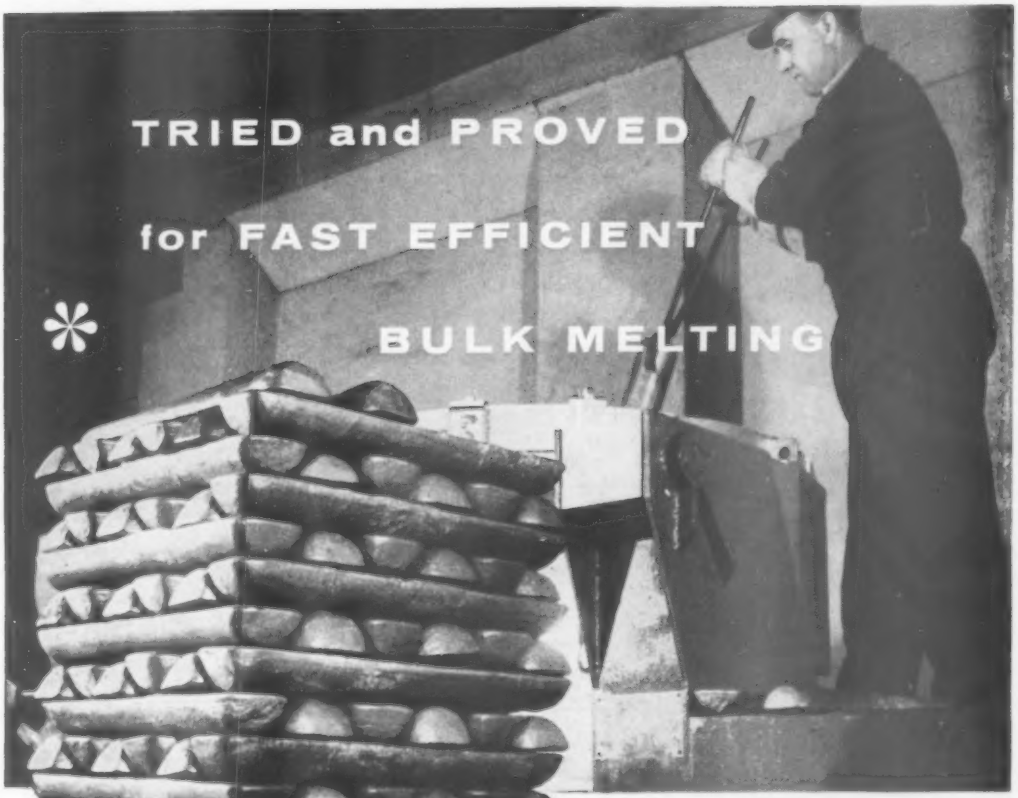

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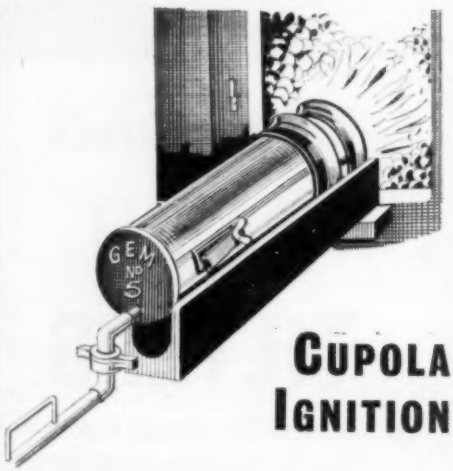

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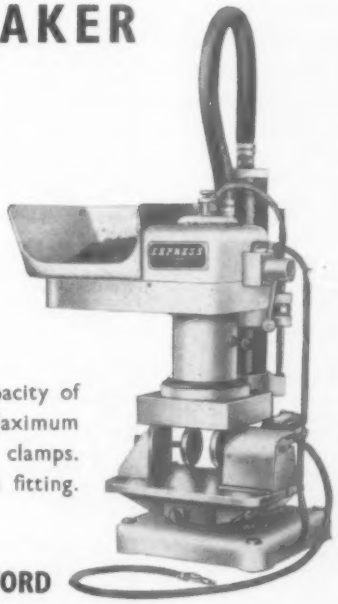

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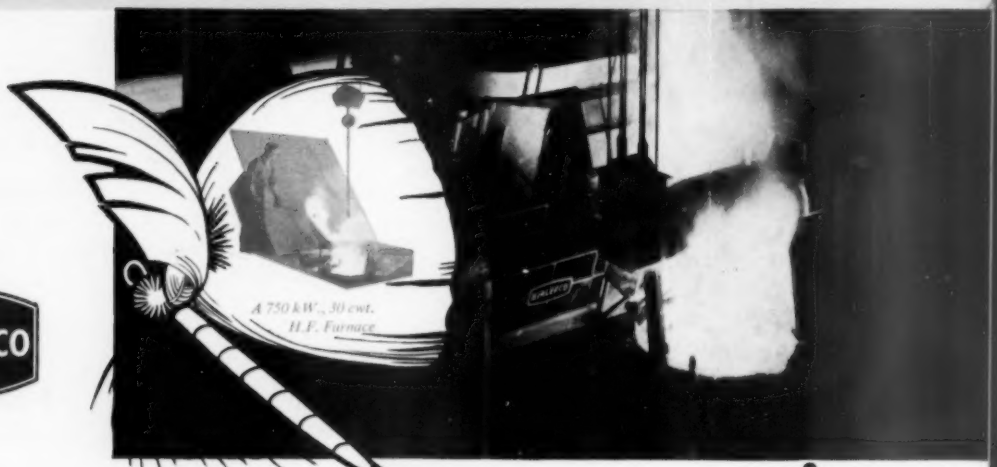

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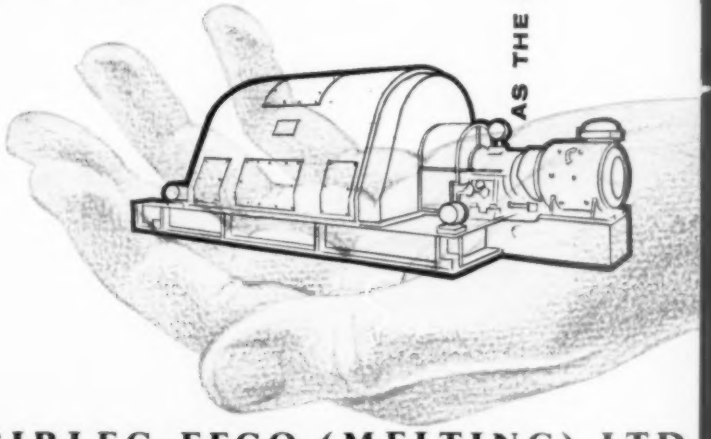
BIG FURNACES AS OR SMALL AS THE JOB IN HAND

Birlefco melting equipment is always ready to meet current production requirements, be they a few hundred pounds of high-tensile steel for the mass production of fish hooks—or bulk metal for the larger components, for the manufacture of generators, turbo-alternators, etc.

Birlefco design experience, manufacturing skill and all round 'know how' provide a unique service to the melting industry—no matter how big or small the problem may be.

Specialists in all types of melting equipment: Arc Furnaces from 1 to 150 tons capacity; Mains Frequency and High Frequency Melting Plant from 10 lb. to 20 tons capacity; Induction Heating Equipment.



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